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TRAVELS

IN

ENGLAND, SCOTLAND,

AND THE

HEBRIDES;

UNDERTAKEN FOR THE PURPOSE OF EXAMINING THE STATE OF

THE ARTS, THE SCIENCES, NATURAL HISTORY AND MANNERS,

IN

GREAT BRITAIN:

CONTAINING

Mineralogical Deſcriptions of the Country round Newcaſtle; of the Mountains of Derbyſhire; of the Environs of Edinburgh, Glaſgow, Perth, and St. Andrews; of Inverary, and other Parts of Argyleſhire; and of

THE CAVE OF FINGAL.

IN TWO VOLUMES WITH PLATES.

TRANSLATED FROM THE FRENCH OF

B. FAUJAS SAINT-FOND,

MEMBER OF THE NATIONAL INSTITUTE, AND PROFESSOR OF GEOLOGY IN THE MUSEUM OF NATURAL HISTORY AT PARIS.

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ERRATA.

VOL. II.

Page 10, line 15, for *perſpective* read *proſpect.*
29, — 1, for *ſet* read *ſat*
39, — 7, for *broke* read *broken.*
40, for *M'Quaire*, in the note at the bottom, read *M'Quarie.*
47, line 1, for *tetrahedial* read *tetrahedral.*
47, — 4, dele the comma after truncature.
47, — 18, for *great* read *greater.*
51, — 11, for *quartroſe* read *quartzoſe.*
64, — 6, for *unexpreſſible* read *inexpreſſible.*
81, — 3, after race inſert *and.*
106, — 8, dele *as.*
117, — 17, dele the comma after ſuſceptible.
120, — 10, for *ready* read *readily.*
120, — 12, for *porphyric* read *porphyry.*
128, — 26, dele the colon after walls.
128, — 27, for *conſiſt* read *conſiſts.*
135, — 15, for *theſe* read *this.*
140, — 5, after perfect inſert *priſms.*
141, — 2, for *contribute* read *contributed.*
145, — 2, for *ſchiſtus* read *ſchiſti.*
151, — 23, for *iron* read *inn.*
154, — 23, for *open* read *opens.*
164, — 7, for *ingenious* read *injurious.*
171, — 7, for *ſchiſtus* read *ſchiſtous.*
186, — 4, for *where* read *when.*
191, — 3, dele the comma after cryſtallization.
195, — 10, for *opened* read *open.*
230, — 3, of the note, for *tranſlations* read *tranſactions.*
235, — 10, dele *are.*
272, — 21 for *mephits* read *mephitis.*
272, — 2 of the note, for *gas* read *gaſes.*
278, — 10, for *production* read *productions.*
303, — 4 of the note, for *Traſtlemary* read *Tracleſtemars.*
——— — 9 of the ſame, after *for* inſert *in.*
313, — 26, dele *to* after *exhibiting.*
320, — 5, for *ſeem* read *ſeemed.*
324, — 12, for *friendly* read *kindly.*
338, — 6, for *arrid* read *arid.*
344, — 20, for *inflammability* read *inflammation.*
347, — laſt of the note, after *turn* inſert *their attention.*
348, — 2, for *poſſeſs* read *poſſeſſes.*

The reader will perceive that the Greek ſingular *ſtalactites*, *zeolites*, &c. are in ſeveral places uſed inſtead of *ſtalactite*, *zeolite*, &c. Theſe, with other inadvertencies, are left to his own candid correction.

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TRAVELS

TRAVELS

THROUGH

ENGLAND AND SCOTLAND

TO THE

HEBRIDES.

CHAPTER I.

Departure from Oban for the iſland of Mull.—Paſſage of the ſound of Mull.—Small iſle of Niort.—Druidical Monuments.—Arrival at Aros.

I HAD finiſhed my ſolitary excurſions in the environs of Oban, and was nearly done with arranging my obſervations when the people of the inn announced the arrival of a traveller, who, aſtoniſhed to learn, that there was a Frenchman alone in ſo deſart a place, begged permiſſion to ſee me.

He was a young Britiſh Officer of the name of M'Donald, who had come to wait at Oban for a favourable opportunity of going

to the iſle of Sky, which was the place of his nativity.

He had proſecuted his earlier ſtudies at the Scotch college in Paris; he ſpoke the French language tolerably, and was not deficient in information. His arrival was a happy and agreeable rencounter for me. I mentioned to him the object of my journey, and my ſpeedy departure for the iſle of Mull, where my fellow-travellers were waiting for me to accompany them to the celebrated cave of Fingal, in the iſle of Staffa.

Mr. M'Donald replied, that though his native country was at no great diſtance from that iſland, and though he had often heard of the cave of the father of Oſſian, his education in France and his travels had not yet given him an opportunity of viſiting a place ſo remarkable: but, that if I were kind enough to permit him, he would gladly embrace the occaſion of accompanying me thither; and that he would alſo have the pleaſure of being uſeful to me in the country, as he underſtood the Earſe or Celtic language, the only one uſed in the iſles of the Hebrides.

I accepted the obliging offers of Mr. M'Donald with ſo much greater pleaſure and gratitude,

gratitude, as they appeared to proceed from a man of a ſociable diſpoſition, and were delivered in a tone of frankneſs and affability which prepoſſeſſed me in his favour: I reflected alſo that it was in his power to do me ſome ſervices in the iſle of Mull, where he had ſeveral acquaintance, particularly Mr. M'Lean, to whom the Duke of Argyle had given me letters of recommendation. We now waited only for the arrival of the boat which was to carry us; and which at length entered the harbour in the night of the 23d of September.

The crew conſiſted of no more than two fiſhers from the iſle of Sky, who were clothed in the faſhion of the Hebrides, that is, in the dreſs of the Scotch Highlanders. Our veſſel had neither decks nor rigging; ſhe was of the worſt conſtruction; and dragged at her ſtern a ſmall skiff capable of holding at moſt only four perſons.

The fare was agreed upon, and it was ſettled that we ſhould ſet out on the following day; but from ſome capricious motive, our boatmen changed their reſolution, and wiſhed to remain for three days longer. It was not without much flattery, repeated remonſtances,

and a preſent of two bottles of rum, that Mr. M'Donald at laſt prevailed on them to make ready for our departure on the next morning.

We left the ſhore of Oban, at ſeven in the morning of the twenty-fourth. The ſea, though not tempeſtuous, was ſomewhat agitated; the winds were variable, and the currents of the entrance of the ſound of Mull running in oppoſition to the tide, obliged our intrepid fiſhers to make ſeveral manœuvres, which were exceedingly laborious, as there were only two of them, and they were deſtitute of many articles of tackling. All this, however, was mere ſport to men inured to the moſt lengthened fatigue, and accuſtomed, in the time of the herring-fiſhery, to brave all the dangers of this frightful ſea.

On clearing the harbour, we came in ſight of that ſucceſſion of iſlands which ſkirt the ſound, and exhibit a diverſified picture. The iſle of *Liſemore* was at a very ſmall diſtance on our right; that of *Kerera* in the oppoſite quarter; and the Peaks, or as they are called, *Paps of Jura*, towered above the numerous mountains of the Hebrides. Loch-aber, which the largeſt veſſels may navigate as high

as

as Fort William, was left behind us. The isle of Mull appeared in view; that of Sky was in the distance; and the continued ridge of Morven, so much celebrated in the songs of Ossian, and which exhibits so various and picturesque an appearance, bordered the right bank of the channel which we sailed along.

In passing near the extremity of the isle of Lismore, I observed, with the aid of my perspective, on a small neighbouring island, which was inhabited, one of those monuments of rude stone known by the Hebridian appellation of *Cairn*.

This monument, of great antiquity, and erected in so desart a situation, naturally attracted my attention. I requested my companion to induce our boatmen to convey us thither; but as this small island, or rather large rock, was surrounded with breakers, they replied, that it would be impossible to approach but in the skiff, and that even in it we should run a considerable risk.

I did not understand a word of the language of our conductors, but I observed one of our seamen preparing to enter the skiff; I confidently followed him, and Mr. M'Donald did the same. The skiff was so small and so

very ſhallow, that there was hardly room to ſeat ourſelves in it. The boatman took hold of the oars; Mr. M'Donald ſat at the helm, which conſiſted of the half of an oar, and we puſhed off.

Our curioſity in this inſtance prevailed over our prudence; we were borne along by the current with the rapidity of an arrow, towards the ſmall iſland, which is called Niort; and it required all the addreſs of our boatman to land us ſafely. The iſle is about half a mile in circumference, and riſes only about twenty-five feet at moſt above the water. It may be regarded as a great rock, of which the ſummit is flattened into a ſmall plain. The fury of the waves of this tempeſtuous ſea has laid the rock almoſt entirely bare, and carried away the ſmall quantity of earth which is formed there by time, ſo that nothing grows upon it except a few *lichens* and ſome ſcurvy graſs in the ſheltered cavities. The rock is compoſed of limeſtone, intermixed with a little clay; it is of a blackiſh grey colour, and only forms a ſingle maſs, in which there is no trace either of beds or banks.

Our

Our attention was much attracted by the kind of ruſtic pillar which ſtood on this crag. It was nine feet high, three feet broad, and two feet of average thickneſs. It is formed of grey granite, in which quartz and mica are predominant. The felt-ſpar is rather diſpoſed in ſmall ſtreaks than in cryſtals, and though the texture of the ſtone is ſomewhat fiſſile, it is hard and ſolid in its fracture.

Though this column poſſeſſes ſome regularity in its form, it does not bear the ſlighteſt trace of workmanſhip. It may be conſidered as a natural block of a longitudinal ſhape, taken from the quarry in its rude ſtate, and erected on the higheſt point of this ſmall iſle. It is two feet in the earth, and kept upright by two ſolid but ruſtic ſtuds, which give it a very ſtable foundation *.

* In ſome quarries of granite, and even at times in porphyric rocks, are found ſimilar blocks divided into parallelopipeds of various degrees of regularity and length. They are the effect merely of the contraction of the matter during the time of the aggregation of the particles. Near the ſmall town of Saint Siphorien-de-Lay, within three leagues of Roane, is a porphyric rock divided into large priſms, of which ſeveral are as remarkable for regularity as thoſe of the largeſt and moſt perfect columns of baſaltes.

Our boatman told Mr. M'Donald that he had often ſeen this ſtone; that it had been placed there by the hands of Oſſian; and that in ſeveral other iſles we ſhould ſee much larger ſtones, which had been ſet up by the ſame perſon. For in the mountains of Scotland, and the Hebrides, every thing that appears great, extraordinary, and wonderful, is uniformly regarded as the work of Oſſian.

Whatever may be the prevailing traditions reſpecting theſe ancient columns, this one evidently diſcovers an intention of erecting a ſimple but durable monument.

This intention is plainly marked by the kind of ſtone which has been ſelected for the purpoſe. One ſhould think that it would have been more convenient to employ that of which the iſlet itſelf is compoſed. But whatever muſt have been the motives, whether it was known that the latter was leſs durable than the granite; or whether, from the uſe of iron being unknown by thoſe who erected it, it was impoſſible for them to cut out a ſimple pillar from a calcareous rock which is not ſeparated in banks; it is nevertheleſs true that this ruſtic column of granite has been tranſported thither; an undertaking

dertaking which muſt have been attended with great difficulty to men ignorant of the mechanic arts.

Though we ſpent but a very ſhort time in examining this ſtone, it was not without great difficulty that we got back to the veſſel which the currents drove to a conſiderable diſtance, notwithſtanding the efforts that were made to keep near us. We were nearly an hour in regaining her.

We continued our courſe through the ſound of Mull, with the granitic mountains of Morven ſtill on our right. We paſſed very near the old caſtle of *Ardtorniſh*, built upon a point which commands a view of the whole ſound. On our left were the black volcanic rocks of the iſle of Mull. At length, after a navigation of ſeven hours and a half, we entered the bay of Aros in that iſland, where we diſembarked.

I hardly know by what term to denominate, five or ſix houſes in a groupe, and ſeven or eight others ſcattered around, the whole of which taken together, are here called Aros. They can ſcarcely be called a town or a village; they may more properly be termed a hamlet; but by whatever name one may

 chooſe

chooſe to diſtinguiſh them, they are certainly inhabited by very kind and hoſpitable people.

The bay of Aros was anciently defended by a ſtrong caſtle, which formed the reſidence of M'Donald of the iſles; the ruins of this fortreſs are ſtill extant; and it appears to have been partly built of baſaltic priſms.

We were received with the moſt frank and hearty welcome by an aged gentleman, who is ſtyled Campbell of Aros. He lives in philoſophic contentment in the modeſt habitation of his fathers; which is a gothic building, ſtanding on a black volcanic rock, totally deſtitute of verdure, beat by the tempeſts, and yielding no other perſpective than that of a raging ſea abounding in ſhipwrecks.

Mr. Campbell, wrapped in the Hebridian faſhion, in a large mantle of variegated ſtuff, introduced us into his houſe, and refreſhed us with ſome port wine, ſea biſcuit, and preſerve of myrtil berries. His wife, who was not much younger than himſelf, ſeemed much aſtoniſhed at ſeeing ſtrangers quit their native country, to viſit a region ſo wild, and ſo difficult of acceſs. Both of them preſſed us very much to remain a few days with them; but as I was anxious to rejoin my fellow-

fellow-travellers, who were waiting for me at Mr. M'Lean's, of Torloisk, we begged the favour of Mr. Campbell to procure us horſes; which he had the goodneſs immediately to provide. The horſes were quite ſmall, and had only a piece of rope for a bridle; but they were pretty ſtrong and inured to the rugged roads of the country. We took leave of the old gentleman and his lady, and purſued our journey.

CHAP-

CHAPTER II.

Road from Aros to Torloisk.—Stay at Mr. M'Lean's.—Accidents which happened to my fellow-travellers during their passage to, and continuance on, the Isle of Staffa.

THE miles of Scotland, particularly those of the isles, are nearly double the length of the English miles. From our ignorance of this difference, we found that we had been much deceived when we were told, that from Aros to Torloisk was only eight miles. Imagining the computation to be by English miles, as we had set off at four in the evening, we conceived that we could easily ride that distance before dark.

I ought not to forget to mention that Mr. M'Donald, who accompanied me from Oban with the intention of visiting the isle of Staffa, had no sooner reached Aros than he changed his dress. He had travelled before in English regimentals, but upon arriving here he opened his portmanteau, and to my great surprise, in about half an hour after, appeared in the complete vesture

veſture of the inhabitants of the iſles: plaid, jacket, kilt, feathered bonnet, buskin-hoſe, durk, no part of it was omitted. I was ſcarcely able to know him again in this dreſs. He told me, that it was the garb of his fathers, that he never appeared in any other when in theſe iſlands, and that the wearing of it was a mark of attachment to his fellow-countrymen, with which they were much pleaſed.

We ſet out on our two little horſes, with two perſons to conduct us and bring them back, ignorant that our way lay acroſs ravines, heaths, marſhes and mountains, difficult of acceſs, and without any trace of a road.

Whilſt day-light remained, we made pretty good progreſs; our guides puſhed forward with ſuch ſpeed, that they often outran our horſes, though they went at a good pace. Theſe two Hebridians were young and handſome; neither ſtreams, pools, bogs, nor mountains, could interrupt their courſe; and I admired their courage, gaiety, and elegant appearance. A blue military bonnet, with a border of red, green, and white, and ſurmounted with one feather, decorated their heads. A party coloured mantle or plaid hung from the

the right ſhoulder, and paſſed gracefully over the left arm. They had a waiſt-coat and jacket of the ſame ſtuff. Their thighs and legs were half naked. A Tartan buskin with a ſtout kind of ſhoes, covered the lower part of the latter; and compleated their Roman habit. The poniards in their girdles gave them a military air, and the ſticks in their hands, ſerved to help them over the waters.

Their willingneſs to be uſeful to us rendered them doubly intereſting. They always went before to point out the way to us, returning however at intervals to careſs and animate our horſes, and to enquire whether we had occaſion for their ſervices.

They ſeemed proud and overjoyed at ſeeing a man of diſtinction in the ſame dreſs as themſelves; and teſtified their ſatisfaction by approaching Mr. M'Donald, and telling him, with a ſmile on their faces, in their expreſſive language, that they would follow him to the world's end *.

Night

* Johnſon alſo, in his journey to the Weſtern Iſlands of Scotland, praiſes two Highlanders whom he had hired as guides on his way from Inverneſs.

« At

Night now came on, we were yet ſcarcely half way to the place of our deſtination. Our guides and our horſes ſoon ſlackened their pace; the road grew deteſtable, and we were often obliged to alight, ſometimes on the verge of marſhes, and ſometimes in the midſt of heaths, through which we groped our way with extreme difficulty. At length we completely loſt our direction. The night was ſo dark that our horſes fell repeatedly, and our guides were greatly perplexed. After thus wandering for a long time without any certain courſe, we at laſt deſcried a light on an elevated ſituation, to which we directed our ſteps. We found it to be the caſtle of Torloisk, where we arrived at eleven, worn out with fatigue, anxiety, and vexation.

We ſoon diſcovered, as we entered, that we had now reached our place of deſtination.

"At Inverneſs," ſays he, "we procured three horſes "for ourſelves and a ſervant, and one more for our bag-"gage, which was no very heavy load.—We took two "Highlanders to run beſide us, partly to ſhew us the "way, and partly to take back from the ſea-ſide the "horſes, of which they were the owners. One of them "was a man of great livelineſs and activity, of whom his "companion ſaid, that he would tire any horſe in Inver-"neſs. Both of them were civil and ready-handed. Ci-"vility ſeems part of the national character of High-"landers."

A do-

A domeſtic told our guides, that Mr. M'Lean had not yet gone to bed, and that I had been impatiently expected for ſeveral days.

We were ſhewn into a parlour, where I found Mr. M'Lean, to whom I gave the letter which I had from the Duke of Argyle. He received me with the moſt obliging kindneſs, and preſented me to his wife, daughter, and ſeveral other ladies and gentlemen, who were occupied in making a little muſical concert.

Miſs M'Lean, a girl of a moſt charming figure, was ſeated at a harpſichord, on which ſhe executed ſome excellent Italian muſic. Mr. M'Donald had no need of being introduced, his name was already known, and his dreſs ſufficiently announced him. We were inſtantly overwhelmed with civilities, kindneſſes, and delicate attentions, which diſſipated all our troubles. Every one around us was ſo obliging and ſo affable, that from that moment we regarded ourſelves as members of the family.

How powerfully attractive is this rural politeneſs, ſeaſoned with expreſſions and geſtures which announce the moſt delicate feeling. We were now on the true ſoil of

hoſpi-

hoſpitality; all the inhabitants of the iſland, though it contains a population of ſix thouſand ſouls, have the ſame family-name of M'Lean; they are diſtinguiſhed by their Chriſtian names only, or by that of their reſidence; they are almoſt all ſhepherds or fiſhers.

We were informed that my fellow-travellers had ſailed at five in the morning of the ſame day, to viſit the iſle of Staffa; that they would have waited with pleaſure to make the voyage in company with me; but the ſeaſon was already ſo far advanced, and particularly the ſea was ſo boiſterous in this region, that they had determined to take advantage of an interval of calm, which did not promiſe a long continuance; ſuch was their eager impatience to ſee that famous iſle.

They had embarked with a friend of Mr. M'Lean, and their own ſervants, in two ſmall boats. But they had ſcarcely gone four or five leagues, before the weather ſuddenly changed, and the ſea became tempeſtuous. Mr. M'Lean thought it ſo rough, that he was afraid they had not been able to effect a landing on the iſle of Staffa, on account of the breakers which ſurround it, and that they

had been obliged to take refuge in the iſle of *Iona* or *Ykolmkill*, which is fifteen miles from Staffa, and has a ſmall creek.

We expected that the ſea would be a little calmer by the next day. We repaired therefore, at an early hour, along with Mr. M'Lean and his family, to the water ſide, which was about a furlong from the caſtle, to ſee whether the boatmen would venture to come for a ſupply of proviſions; but the ſea was ſtill more dreadful, and totally impaſſable.

We now began to be very uneaſy on their account. They were eight in number, including the domeſtics, and they had only one day's proviſion with them.

The evening arrived without any appearance of them; our anxiety was redoubled, and we paſſed a very unhappy night.

On the next day, which was Sunday, and the third day from their departure, I roſe at four in the morning to examine the weather. I diſcovered with pleaſure that the wind had ſomewhat fallen, and that the ſea was not ſo high. We went, before noon, to take a walk on the bank; and at length, with the aid of a good glaſs, we deſcried them at a diſtance.

They

They arrived at one o'clock, to their own and our great ſatisfaction. They were ſo emaciated with fatigue, vexation and hunger, were ſo much in want of food and reſt, and ſo uneaſy, that they entreated us not to diſturb them with any queſtions until they were a little refreſhed, and particularly relieved from a multitude of lice that tormented them moſt cruelly. "Fly! fly from our ap-"proach," ſaid they, "we have brought ſome "good ſpecimens of mineralogy, but our col-"lection of inſects is numerous and horrible." We could not keep from laughing at this addreſs, their gait, and the reſtleſs motion of every part of their body. They were inſtantly conducted to their apartments, where their firſt care was to clean themſelves, and, after eating ſomething, to take a few hours repoſe.

In the evening they returned to the parlour, where they were received with every demonſtration of kindneſs. Their appearance was now freſh and elegant; but we, notwithſtanding, jocularly asked, whether it was yet ſafe to approach them. "We "have caſt off every thing," replied they, "and of all our evils there remains only the

"itch, reſpecting which, we can ſay nothing, "as it has not yet made itſelf felt."

They then recounted the circumſtances of their unfortunate paſſage. Notwithſtanding the fine appearance of the weather on the day of their departure, ſcarcely had they proceeded ſix miles, when there aroſe a violent gale, which worked the ſea into the moſt terrible commotion. They would have willingly put back, had not the rocks which ſkirt the coaſt of Torloisk, rendered it equally dangerous to approach it at that moment; the currents and the tide were alſo unfavourable to their return. They were, therefore, obliged to keep the offing, and to brave the impetuoſity of the billows, driven ſometimes in one, and ſometimes in another direction, and every inſtant in danger of being ſwallowed up, were it not for the addreſs and experience of the boatmen who had been accuſtomed to theſe terrible ſeas from their infancy.

Having, at length, after many ſtruggles and dangers, reached the iſle of Staffa, they found it ſtill more difficult to effect a landing. By the aſſiſtance however of the people of the iſle, who, on ſeeing their diſtreſs, threw

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out ſome ropes to them, and by watching a favourable wave, they reached the ſhore without any other accident than that of wetting themſelves to the skin.

The coaſt however was too rugged and ſteep to admit of hauling up the two boats, which were obliged to put off again, and to take ſhelter in the iſle of Iona or Ykolmkill, about fifteen miles from Staffa.

Our friends, continuing their recital, informed us, that the only two families who inhabited this ſmall iſland, received them with the moſt affecting hoſpitality, and that the one which was in the moſt eaſy circumſtances invited them to enter their hut, where they were uſhered into the midſt of ſix children, a woman, a cow, a hog, a dog, and ſome fowls.

There was laid out for them a remnant of oaten ſtraw which had been uſed to litter the cow for ſeveral days before. This ſerved as their ſeat, table, and bed. A fire of bad turf, or rather ill-dried ſod, lighted in the middle of this cabin, blinded them with ſmoak, at the ſame time that it dried their clothes and ſerved to roaſt, in an indifferent manner, ſome potatoes, which, with ſome milk, were

the only articles the place afforded, and thoſe in very ſmall quantities. The proviſions which they had brought with them were conſumed at one repaſt.

The ſea broke upon the iſland with ſuch impetuoſity, and ruſhed into the caves which penetrate its interior with ſo much noiſe, that the hut ſhook to its foundation, and our adventurers could get no ſleep.

On the next day it rained inceſſantly until noon. The ſea, far from falling, raged with ſtill greater fury; ſo that the boatmen could not venture to carry any ſupply from the iſle of Iona.

In the afternoon, the rain having ceaſed, the captives ſurveyed the iſland and viſited the cave of Fingal. William Thornton took ſome views of it with great care; and they made a collection of the moſt curious ſtones, among which were ſome fine zeolites.

In the evening they had the ſame reception, the ſame ſupper, and the ſame bed. A new incident, however, occurred: The maſter of the cottage, his wife, and children lived in ſuch a horrid ſtate of filth that the place completely ſwarmed with vermin. Detachments of lice approached on all ſides to

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pay their reſpects to the new lodgers, who were ſoon entirely covered over with them. Theſe were their moſt cruel torment, and formed the object of an occupation which did not allow them a moment's reſpite.

On the third day, the ſea was ſomewhat calmer. Their diſtreſs was extreme. They walked repeatedly round the iſland, and aſcended the higheſt part of it to look for the approach of the boats, which at length made their appearance, and came to deliver our poor friends from their afflicting captivity. After thanking their hoſts for their kind offices and hoſpitable attention, they took leave of them on their return to Torloisk; where we had the happineſs to welcome them with all the ardour of friendſhip. We congratulated them on their being ſo fortunate as to eſcape with ſuffering only a few days abſtinence. Finding them all ſafe, it was not without a hearty laugh, that we heard them relate their misfortunes, and particularly the diverting epiſode of the lice.

Their account brought to my remembrance, at the moment, a ſimilar adventure which

happened in the ſame iſle, and probably in the ſame houſe, to Sir Joſeph Banks, who ſet out from London in the year 1772, on a voyage to Iceland, in company with Solander, James Lind, Gore, Walden, and Troil; and, in paſſing, paid a viſit to the fine cave of Fingal, of which he was the firſt who gave a deſcription.

On their arrival at Staffa, they erected a tent, to paſs the night under it; but the only inhabitant then on the iſland preſſed Sir Joſeph ſo ſtrongly to go to ſleep in his hut, that he complaiſantly conſented, and left the tent to his companions.

On leaving the hut next morning, he diſcovered that he was completely covered with lice. He mentioned the circumſtance to his hoſt in terms of mild reproach. But the latter, who was touched to the quick, perked himſelf up, and aſſuming a tone of conſequence, retorted the accuſation in a haughty and ſomewhat harſh manner on Sir Joſeph, aſſerting, that it was he who had imported the lice into his iſland, and obſerving, that he might as well have left them behind him in England.

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The detail of the adventures of my poor friends, did not much encourage me to attempt the ſame voyage. Mr. M'Lean alſo did not ceaſe to impreſs me with the inconſtancy of the weather, the dangers of diſembarking on the iſland, the advanced period of the ſeaſon, and his apprehenſions leſt, could we even ſeize a favourable moment to waft us thither, we ſhould not find it equally eaſy to return, and leſt we ſhould be obliged to remain there, not only ſeveral days like our friends, but perhaps for ſeveral months.

" I am advanced in years," ſaid Mr. M'Lean; " I have made ſeveral voyages " to India, and I am accuſtomed to the ſea; " but I have never yet, from complaiſance to " any of the perſons recommended to my at- " tention, accompanied them to the iſle of " Staffa, without having occaſion to repent " the attempt. During the courſe of my " life I have made this voyage ſix times, on " the moſt favourable days and with skilful " ſeamen, and every time I met with ſome " dangers, either in going or returning. " Its coaſt is ſo rocky, and the ſea, which ſur- " rounds it, rages in general with ſo much " fury, that the landing, even with the ſmall-

" eſt

" eſt boats, is the moſt terrible of all dan-
" gers*."

All theſe accounts were not very encouraging, eſpecially to one, who, like me, is almoſt always ſick on the water; but curioſity overcame the ſuggeſtions of fear and prudence. What, ſaid I, inceſſantly to myſelf, ſhall I have come in a manner to the very entrance of this renowned cave, and from ſuch a diſtance too, without enjoying a view of it? Shall I thus eaſily forego the opportunity of obtaining new information and inſtructive facts, on a ſubject of natural hiſtory in which I feel ſo much intereſt as that of ancient volcanos? and ſhall I not be able to accompliſh what my fellow-travellers have performed? Or, ſhall I heſitate to encounter the ſame danger? All theſe reflexions irrevocably fixed my determination; and I reſolved to ſet out at ſunriſe next morning, if the ſea ſhould be anywiſe paſſable.

I inſtantly engaged a boat for the purpoſe. Mr. M'Donald ſaid, that he ſhould accompany me; and my intrepid friend, William Thornton, ſcarcely yet recovered from his fatigue,

* " Here," ſays Mr. Pennant, " Æolus may be ſaid to
" make his reſidence, and be ever employed in fabricating
" blaſts, ſqualls, and hurricanes."

not-

notwithſtanding all the dangers he had already met with, told me, that he was alſo ready to recommence the voyage. This young American had ſo ſtrong a deſire of information, particularly in every thing connected with Natural Hiſtory, that nothing was capable of damping his ardour.

CHAP-

CHAPTER III.

Voyage to Staffa.

NEXT morning at four o'clock, one of our boatmen came to inform us that the weather began to be more moderate, and that it was probable we ſhould have a fine day. Having made the requiſite arrangements on the preceding evening, we were ſoon ready, and reached the beach before ſun-riſe.

Our rowers were four young and bold Hebridians, who appeared to undertake this ſhort voyage with pleaſure; for they are fond of every thing which reminds them of Oſſian, and they ſeemed to regard it as a happineſs and honour to conduct ſtrangers to the cave of Fingal. We beſides, allotted them a quantity of refreſhments, of which, to be prepared againſt whatever might happen, we laid in an abundant proviſion.

The boat was ſo ſmall as to be incapable of carrying a ſail. Our four ſeamen ſeated themſelves on their benches; Mr. M'Donald took hold of the helm, William Thornton and

and myſelf, ſet down on a bundle of ſea-weed, and we proceeded under the auſpices of the genius who preſides over the ſcience of Nature, and to whom we addreſſed a ſhort invocation.

In little more than an hour and an half we doubled the point of the iſle of Ulva, oppoſite to that of Mull, near Torloisk, which we had ſet out from, and entered on the open ſea: we ſoon found, that in theſe regions, the ancient and majeſtic ocean does not require the influence of the northern blaſt to ſwell its ſurface into immenſe waves.

Continuing our courſe, we had a view of the volcanic iſles of Bacabeg, and the Dutchman's Cap, with thoſe of Lunga, Sky, Gometra, Iona, &c.

We could not have wiſhed for a more agreeable paſſage at ſo advanced a ſeaſon. Our ſeamen, making Mr. M'Donald their interpreter, aſſured us, that ſo fine a day was very uncommon in that country, and ſeldom occurred twice in the ſame year. To teſtify the chearfulneſs with which it inſpired them, they began to chaunt in chorus the ſongs of Oſſian. There is not a native of theſe iſlands, from the oldeſt to the youngeſt, that is not able

able to repeat, from memory, long paſſages or hymns of that ancient and celebrated bard.

The ſongs continued a long time. They conſiſted of monotonous recitatives, ending in choruſſes equally monotonous. Their predominant character was a ſort of dignity intermixed with plaintive and melancholy tones. The oars, which always moved in cadence, tended to make the monotony more complete. I became drowſy, and ſoon fell into a profound ſleep.

I know not how long I remained in this ſtate; but I was awaked from it by the motion and noiſe of the ſeamen, and I was told that we were now cloſe upon the iſle of Staffa, and near ſome reefs, which required new manœuvres. Here I had an opportunity of witneſſing, not without dread, the addreſs and intrepidity of our conductors, who knew how to ſeize the favourable inſtant to avoid being daſhed to pieces, and to chooſe the propitious ſurges which afford a ſafe paſſage over thoſe rocks that render it ſo dangerous to approach the iſland.

Two of the inhabitants of the iſland ſoon made their appearance, and threw down to

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us from its craggy height ſome ropes, with the aid of which and a fortunate wave, we diſembarked amidſt a cloud of foam.

Theſe two men conducted ourſelves, and our ſmall crew, to a level ſpot on the higheſt part of the iſle, where there ſtood two houſes, or rather huts, conſtructed of large blocks of lavas and mutilated priſms of baſaltes, they were covered over with green ſods, and had no other paſſage for the light than the door, which was only three feet high, and the chimney, which conſiſted of a pyramidal tunnel in the middle of the hut.

The women and children of the two families inſtantly came out to meet us, and requeſted that we would enter their habitations: but being already informed of their exceſſive ſlovenlineſs, we were inflexible to their entreaties; and juſtly preferred to receive their civilities and their compliments in the open air.

Finding, that it was impoſſible to prevail with us by the moſt obliging geſtures, they reſolved to ſhew the marks of their reſpect for us on the ſmall eſplanade in front of their dwellings.

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The men, women, and children, firſt formed themſelves in a large circle around us and our ſeamen. Then one of the women, whoſe appearance was rendered moſt diſguſting by filth and uglineſs, brought out a large wooden bowl filled with milk, with which ſhe placed herſelf in the center of the circle. She viewed us all round with attention, and immediately came up to me, and pronouncing ſome words, preſented the bowl with a ſort of courteſy. I held out my hands to receive it; but ſhe drank ſome of it, before ſhe gave it to me. I followed her example, and paſſed the veſſel to William Thornton, who was next to me; he gave it to Mr. M'Donald; and it thus paſſed from hand to hand, or, more properly, from mouth to mouth, till every perſon had taſted of it. Having made our acknowledgments for this kindneſs, they immediately appointed two guides to accompany us to the cave of Fingal, and all the remarkable places of this ſmall iſle. We ate a morſel of bread, to take off the edge of our appetite during the walk; as it was agreed upon, that in order to looſe as little as poſſible of ſo favourable a day, we ſhould poſtpone taking our repaſt till we were ſeated in the boat on our way

way back. This allowed us ſufficient time to ſee all the curious objects of the iſland at our caſe, and particularly to direct our attention to that remarkable cave which we had come ſo far to view, and which we felicitated ourſelves on being enabled to examine on one of the fineſt days of the year.

We went to work, therefore, without loſing a moment of time. I ſoon arrived at the entrance of this wonderful grotto, which an ancient, but fabulous tradition, regards as the palace of the father of Oſſian. I was obliged to put off my ſhoes in order to avoid ſlipping into the ſea, which ruſhed in with great noiſe. There is no other means of going into the cave, but by proceeding with the utmoſt precaution along a ſort of cornice on the right ſide, about fifteen feet above the ſurface of the water, and formed of a number of erect baſaltic columns, on the broken tops of which one muſt ſtep with conſiderable dexterity, at the risk of falling into the ſea, which extends to the inmoſt extremity.

Attention is ſo much the more neceſſary here, as the ledge upon which the adventurer treads is entirely perpendicular, in ſome places not above two feet wide at moſt,

and conſiſts ſolely of unequal priſms, very ſlippery, and conſtantly wet with the foam of the waves and the exudations from above. The light, which comes from the grand entrance only, diminiſhes gradually as he proceeds inwards, and thus encreaſes the difficulty of his path.

I ceaſed not to view, to review, and to meditate upon this ſuperb monument of nature, the form of which bears ſo ſtrong a reſemblance to the work of art, though the latter can certainly claim no ſhare in it. I took all the dimenſions of it, with the aſſiſtance of Mr. M'Donald, whoſe ſervices were of the greateſt uſe to me. I wiſhed to obſerve the moſt ſcrupulous exactneſs in that operation, and he perfectly ſeconded my intentions.

During this time, my indefatigable friend, William Thornton, took a drawing of the cave, which could be ſeen in a true point of view from the ſea only. This task was neither agreeable nor free from danger; for it required all the addreſs of our ſeamen to keep him for a few moments in front of the entrance, amidſt the whirlpools and waves of a ſea which ſeemed eager to devour the frail skiff. It was neceſſary to return inceſſantly

to

to the ſame point, and to give reſt at intervals to my dear Thornton, who became ſick with her rolling.

Our ardour and perſeverance were unſhaken, and nothing was capable of diſtracting our attention. We only looked abroad, from time to time, to ſee whether the ſea was likely to be equally favourable during the remainder of the day. After noting down all the particulars of the cave of Fingal, after ſketching ſuch objects as moſt intereſted us, and taking the dimenſions which I was very happy to obtain, I ſtill proceeded to examine ſome other parts of the iſland; and I made a collection of different lavas, zeolites, and other ſtones, tending to illuſtrate the natural hiſtory of the place.

I ſaw with ſome uneaſineſs that the ſun was now about to leave us, and that it became neceſſary to withdraw from a place which preſented ſcenes ſo attractive and volcanic phœnomena ſo remarkable. But the weather might change in a moment, and we had a long paſſage to make; we therefore prepared for our departure. We embarked at half paſt four in the afternoon,

and took ſome refreſhment on our way, for we were almoſt ſtarving with hunger. Our indefatigable Hebridians, who felt neither our curioſity nor our taſte, except ſo far as reſpected the cave of Fingal, for which they entertain a ſacred veneration, had made a hearty repaſt on the iſland, and diminiſhed the weight of our ſtores, while we were occupied in ſeeing and obſerving every thing. They were quite contented, and rowed us along with a ſpirit and vigour, which were at once a proof of their ſtrength and of their habitual capacity for toil. They were completely enraptured with the proſpect of carrying us back ſafe and ſound, owing to the fineneſs of the day and the calmneſs of the ſea. They accordingly continued their ſongs till our arrival at nine o'clock at the caſtle of Torloisk, where the good Mr. M'Lean, his family, and our friends, were impatiently expecting us.

I employed myſelf during ſeveral days in digeſting my obſervations on the iſle of Staffa; and for the ſake of greater method and perſpicuity, I thought proper to adopt the following order. The reader will be pleaſed

pleaſed to recollect that this deſcription is principally intended for ſuch as employ themſelves in the natural hiſtory of ſtones and minerals. If it be conſidered as rather tedious by thoſe who are not attached to that ſtudy, it will be eaſy for them to paſs on to other ſubjects.

CHAPTER IV.

Deſcription and Natural Hiſtory of the Iſle of Staffa.—General Views.

THE iſle of Staffa is ſituated in the fifty-ſeventh degree of north latitude, and fifteen miles weſt of the iſland of Mull. Its form is oblong and irregular. Its coaſts are ſteep and craggy, ſurrounded with ſuperb baſaltic cauſeways, and hollowed into different caves, ſuch as thoſe of Fingal and the *Corvorant*. The iſle is acceſſible only by a ſmall opening or entrance, where the precipice ſinks into a ſlope, but which can admit only a ſmall boat, and that in the calmeſt weather; for if there be the ſmalleſt breeze, it becomes dangerous to attempt landing, and the boat is obliged to take ſhelter in the iſland of Iona.

The total circumference of Staffa is little more than two miles. The moſt elevated part of the iſle is over the cave of Fingal, where it is one hundred and fourteen feet above the level of the ſea in ordinary tides.

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Designed by S.r Pond.

I. King Sculp.e

View of the Isle of Staffa, from the North West.

The ſides of this vaſt rock are entirely bare; the waves and currents batter and undermine them every where. There is on the moſt elevated part only, a flat piece of ground covered with a thin dry turf, contiguous to which is a ſmall ſpot but newly broke up, where a little oats and a few potatoes are raiſed. It has alſo a ſmall paſturage and a ſcanty ſpring, which would be ſoon dried up, were it not that the climate is ſo rainy.

There is neither tree nor buſh to be ſeen, and for firing, the inhabitants are obliged to make uſe of a bad ſod, which they cut in the ſummer ſeaſon in order to dry it. It cannot be called peat; for it conſiſts ſimply of the fibrous roots of common graſs, intermixed with earth. It would be impoſſible to find a worſe fewel; but here neceſſity reigns with abſolute ſway.

The whole of the iſle belongs to Colonel Charles Campbell, of Cambeltown, in Cantyre. It is let at the rent of twelve pounds ſterling; on account, probably, of its fiſhery, for its territorial value ought to be conſidered as nothing.

The total population, at the time when I viſited it, conſiſted only of two families, who lived apart in two huts, conſtructed of rude blocks of baſaltes, roofed over with ſods, and who amounted, men, women, and children, to the number of ſixteen*. Belonging to theſe, there were eight cows, one bull, twelve wethers or ſheep, two horſes, one hog, two dogs, eight hens, and one cock.

Buchanan has ſlightly mentioned the iſle of Staffa and its remarkable columns. But Sir Joſeph Banks, Preſident of the Royal Society of London, is the firſt who examined this grand and aſtoniſhing object of natural hiſtory with the eye of an obſerver. It has riſen into celebrity by his deſcription of it, which was publiſhed in the Tour to the Hebrides, by Thomas Pennant, accompanied with plates.

* At the time when Sir Joſeph Banks, in 1772, viſited this iſland, along with ſeveral naturaliſts, of whom Mr. Troil was one, it belonged to Mr. Lauchlan M'Quaire, and it had only a ſingle inhabitant.

"There is only one hut," ſays Mr. Troil, "which is "occupied by a peaſant, who attends ſome cattle that "paſture there. To teſtify his joy for our arrival, he "ſung all night over in the Earſe language, which we did "not underſtand. He regaled us with fiſh and with "milk."—*Letters on Iceland*, by Troil, Archbiſhop of Linckœping.

Mr.

Mr. Troil, biſhop of Linckœping, one of Sir Joſeph Banks's fellow-travellers, has given a deſcription of the ſame iſle, and of the cave of Fingal, in a learned and curious work upon Iceland*. But as theſe two travellers have principally attended to the pictureſque ſcenes, without entering into thoſe details which are more particularly intereſting to naturaliſts, I conceived that it would give ſatisfaction to ſome perſons that I ſhould purſue the latter track.

OF THE CAVE OF FINGAL, OR AN-UA-VINE.

This ſuperb monument of a grand ſubterraneous combuſtion, the date of which has been loſt in the lapſe of ages, preſents an appearance of order and regularity ſo wonderful, that it is difficult for the coldeſt obſerver, and one the leaſt ſenſible to the phœnomena which relate to the convulſions of the globe,

* This work, written in the Swediſh language, has been tranſlated into French by M. De Lindholm, and printed at Paris by Didot 1781, in 1 vol. 8vo. with plates. It were to be wiſhed that the tranſlator, to whom the Sciences are indebted for rendering that excellent book into our language, had been more acquainted with natural hiſtory; his notes would then have more intereſt, and contain fewer errors.

not

not to be ſingularly aſtoniſhed by this prodigy, which may be conſidered as a kind of natural palace.

To ſhelter myſelf from all critical obſervation on the emotions which I experienced while contemplating the moſt extraordinary of any cavern known, I ſhall borrow the expreſſions of him who firſt deſcribed it. Thoſe who are acquainted with the character of this illuſtrious naturaliſt, will not be apt to accuſe him of being liable to be hurried away by the force of a too ardent imagination; but the ſenſation which he felt at the view of this magnificent ſcene was ſuch, that it was impoſſible to eſcape a degree of juſt enthuſiaſm.

"The impatience which every body felt to "ſee the wonders we had heard ſo largely de- "ſcribed, prevented our morning's reſt; every "one was up and in motion before the break of "day, and with the firſt light arrived at the "S. W. part of the iſland, the ſeat of the moſt "remarkable pillars; where we no ſooner ar- "rived than we were ſtruck with a ſcene of "magnificence which exceeded our expecta- "tion, though formed as we thought upon "the moſt ſanguine foundations: The whole "of that end of the iſland, ſupported by

"ranges

"ranges of natural pillars, moſtly above "fifty feet high, ſtanding in natural colo- "nades, according as the bays or points of "lands formed themſelves; upon a firm baſis "of ſolid unformed rock. In a ſhort time "we arrived at the mouth of the cave, the "moſt magnificent, I ſuppoſe, that has ever "been deſcribed by travellers. . . . .

"The mind can hardly form an idea more "magnificent than ſuch a ſpace, ſupported "on each ſide by ranges of columns, and "roofed by the bottoms of thoſe that have "been broke off in order to form it; be- "tween the angles of which a yellow ſtalag- "mitic matter has exu d, which ſerves to "define the angles preciſely, and at the "ſame time vary the colour with a great "deal of elegance; and to render it ſtill "more agreeable, the whole is lighted from "without; ſo that the fartheſt extremity is "very plainly ſeen from without, and the "air within being agitated by the flux and "reflux of the tides, is perfectly dry and "wholeſome, free entirely from the damp "vapours with which natural caverns in ge- "neral abound."

Let

Let us alſo, for a moment, liſten to Mr. Troil upon the ſame ſubject.

"How ſplendid," ſays this prelate, "do "the porticos of the ancients appear in our "eyes, from the oſtentatious magnificence of "the deſcriptions we have received of them, "and with what admiration are we ſeized "on ſeeing even the colonades of our mo- "dern edifices! But when we behold the "cave of Fingal, formed by nature, in the "iſle of Staffa, it is no longer poſſible to "make a compariſon, and we are forced to "acknowledge that this piece of architec- "ture, executed by nature, far ſurpaſſes that "of the Louvre, that of St. Peter at Rome, "and even what remains of Palmira and "Peſtum, and all that the genius, the taſte, "and the luxury of the Greeks, were ever "capable of inventing *."

Such was the impreſſion made by the cave of Fingal on Sir Joſeph Banks, and on the biſhop of Linckœping. I have ſeen many ancient volcanos, and I have given deſcriptions of ſeveral ſuperb baſaltic cauſeways and delightful caverns in the midſt of lavas. But

* Letters on Iceland, by Mr. Troil.

I have

I have never found any thing which comes near this, or can bear any compariſon with it, either for the admirable regularity of the columns, the height of the arch, the ſituation, the forms, the elegance of this production of nature, or its reſemblance to the maſter-pieces of art: though this has had no ſhare in its conſtruction. It is therefore not at all ſurpriſing that tradition ſhould have made it the abode of a hero.

This charming monument of nature is thirty-five feet wide at the entrance, fifty-ſix feet high, and a hundred and forty feet long.

The upright columns which compoſe the frontiſpiece, are of the moſt perfect regularity. Their height to the beginning of the curvature is forty-five feet.

The arch is compoſed of two unequal ſegments of a circle, which form a ſort of natural pediment.

The maſs which crowns, or rather which forms, the roof, is twenty feet thick in its loweſt part. It conſiſts of ſmall priſms, more or leſs regular, inclining in all directions, cloſely united and cemented underneath and in the joints with a yellowiſh white calcareous matter, and ſome zeolitic infiltrations, which

give

give this fine ceiling the appearance of mosaic work.

The sea reaches to the very extremity of the cave. It is fifteen feet deep at the mouth; and its waves, incessantly agitated, beat with great noise against the bottom and walls of the cavern, and every where break into foam. The light also penetrates through its whole length, diminishing gradually inwards, and exhibiting the most wonderful varieties of colour.

The right side of the entrance presents, on its exterior part, a vast amphitheatre, formed of different ranges of large truncated prisms, the top of which may be easily walked along. Several of these prisms are jointed, that is, concave on the one side, and convex on the other; and some of them are divided by simple transverse intersections*.

These prisms, consisting of a very durable and pure black basaltes, are from one to three feet in diameter. Their forms are

* Sir Joseph Banks's draughtsman, very good and accurate in other respects, has substituted, probably to give greater effect to the cave, large masses of stone irregularly piled on each other, on the right side of the kind of amphitheatre, which serves as a basis to that part of the grove. But there is in reality nothing there except columns.

trian-

triangular, tetrahedial, pentagonal, and hexagonal; and ſome of them have ſeven or eight ſides. I ſaw ſeveral large priſms on the truncatures, of which are diſtinctly traced the outlines of a number of ſmaller priſms; that is, theſe priſms are formed of a baſaltes, which has a tendency to ſubdivide itſelf likewiſe into priſms. I had before obſerved the ſame phenomenon in the baſaltic priſms of Vivarais.

The cave can be entered only by proceeding along the platform on the right ſide, which I have mentioned above. But the way grows very narrow and difficult as it advances; for this ſort of interior gallery, raiſed about fifteen feet above the level of the ſea, is formed entirely of truncated perpendicular priſms of a great or leſs height, between which conſiderable addreſs is neceſſary to chooſe one's ſteps, the paſſages being ſometimes ſo ſtrait and ſo ſlippery, owing to the droppings from the roof, that I took the very prudent reſolution, ſuggeſted by our two guides, to proceed barefooted, and to take advantage of their aſſiſtance, eſpecially in a particular place, where I had room only to plant one foot, whilſt I clung with my right hand

hand to a large priſm to ſupport myſelf, and held the hand of one of the guides by the other. This difficult operation took place at the darkeſt part of the cave; and one half of the body was at the time ſuſpended over an abyſs, where the ſea daſhed itſelf into a cloud of foam.

I was deſirous of penetrating to the fartheſt extremity, and I accompliſhed my purpoſe, though not without conſiderable difficulty and danger. I, more than once, found my attention diſtracted from the obſervations which I was happy to have an opportunity of making, to the thought of how I ſhould get back again.

As I drew near the bottom of the cave, the bold balcony, on which I walked, expanded into a large ſloping ſpace compoſed of thouſands of broken vertical columns. The bottom was bounded by a compact range of pillars of unequal height, and reſembling the front of an organ.

It is worthy of remark, that at the time when Mr. Troil viſited the cave, the ſea, by one of thoſe uncommon chances which do not happen once in ten years, was ſo calm that it permitted him to enter with a boat.

" At

"At the very bottom of the cave," ſays Mr. Troil, "and a little above the ſurface of the "water there is a kind of ſmall cave which "ſends forth a very agreeable noiſe every "time that the water ruſhes into it *."

As the ſea was far from being completely ſtill, when I viſited it, I heard a noiſe of a very different nature every time that the waves, in rapid ſucceſſion, broke againſt its bottom. This ſound reſembled that which is produced by ſtriking a large hard body with great weight and force againſt another hard body in a ſubterraneous cavity. The ſhock was ſo violent that it was heard at ſome diſtance, and the whole cavern ſeemed to ſhake with it. Being cloſe to the place whence the ſound iſſued, and where the water is not ſo deep upon the retreat of the wave, I endeavoured to diſcover the cauſe of this terrible colliſion. I ſoon obſerved, that, a little below the baſis which ſupported the organ-fronted colonade, there was an aperture which formed the outlet of a hollow, or perhaps a ſmall cave. It was impoſſible to penetrate into this cavity, but it may be pre-

* Letters on Iceland.

ſumed that the tremendous noiſe was occaſioned by a broken rock, driven by the violent impetuoſity of the ſurge againſt its ſides. By the boiling motion of the water, however, in the ſame place, it is evident that there are ſeveral other ſmall paſſages, through which it iſſues, after ruſhing into the principal aperture in a maſs. It is therefore not impoſſible, when the ſea is not ſufficiently agitated, to put the empriſoned rock in motion, that the air, ſtrongly compreſſed by the weight of the water, which is in inceſſant fluctuation, ſhould, on ruſhing out by the ſmall lateral paſſages, produce a particular ſtrange ſound. It might then be truly regarded as an organ created by the hand of Nature; and this circumſtance would fully explain why the ancient and real name of this cave in the Earſe language is, *the melodious cave* *.

Sir

* Sir Joſeph Banks is the firſt who gave the cave of Staffa the name of the cave of Fingal. I made the moſt minute enquiries of ſeveral perſons well ſkilled in the Earſe, Gaulic, or Celtic language, to know what relation this cave had to the father of Oſſian. And theſe gentlemen, as well as others, aſſured me, that the miſtake was owing to the name being equivocal. The following is their explanation: The true name of the cave is *an-ua-vine*. *An*, the; *ua*, grotto, cave, cavern; *vine*, melodious. The name of Fingal in the ſame language is ſpelled and pronounced

Sir Joſeph Banks in the deſcription which he has given us of the cave of Staffa, ſays, that "between the angles a yellow ſtalag-"mitic matter has exuded, which ſeemed to "define the angles preciſely." That is true, but the learned Naturaliſt has not told us the nature of this yellowiſh matter.

Mr. Troil mentions it alſo: He ſays, that "the colour of the columns is a dark grey; "but that the joints are filled with a quart-"roſe ſtalactites, which diſtinctly marks the "ſeparation of the columns, and which, by "the variety of its tints, has the moſt agree-"able effect on the eye." There is certainly an error here with regard to the ſubſtance. On breaking off ſeveral pieces of it, which it is not very eaſy to do, owing to the height of

nounced *Fion* in the nominative. But the Earſe nouns are declinable, and the genitive of Fingal is *Fine*; ſo that if one wiſhed to expreſs the cave of Fingal in the Earſe language, he would write *an-ua-fine*. Thus between the Earſe *vine* melodious, and the genitive of Fingal *fine*, there is no other difference than the change of the letter *v* into *f*; and ſome perſon not very well verſed in the Earſe language, might have tranſlated to Sir Joſeph Banks the words *au-ua-vine* by the *cave of Fingal*, whilſt the true and literal interpretation is, the *melodious cave*. In this caſe, the obſervation of Mr. Troil, on the agreeable ſound which he heard iſſuing from the bottom of the cave when the water ruſhed in, is valuable, and comes in ſupport of the true denomination.

the vault, I found that it was nothing but a calcareous matter coloured by the decompoſition of the iron of the lava, and intermixed with a little argillaceous earth. This ſtalactites has alſo very little adheſion, and is in general of an earthy nature. In ſeveral of the priſms I found ſome globules of zeolites, but in very ſmall quantity. I alſo broke off from between two priſms, which were ſo far apart as to admit of introducing my hand, an incruſtation in which the white and tranſparent zeolites was formed into very perfect ſmall cubical cryſtals, ſeveral of which were coloured red by the ferruginous lime ariſing from the decompoſition of the lava. But I muſt repeat, that zeolites is very rare in this cave, and having myſelf broken off all the ſpecimens that I was able to ſee, I doubt whether thoſe who may viſit the place after me will find any quantity of it.

DIMENSIONS OF THE CAVE OF FINGAL.

Breadth of the entrance, taken at the mouth and at the level of the ſea, 35 feet.

Height from the level of the ſea to the pitch of the arch, 56 feet.

Depth

Depth of the ſea, oppoſite to the entrance, and twelve feet diſtant from it, at noon of the 27th of September, fifteen feet.

Thickneſs of the roof meaſured from the pitch of the arch without to its higheſt part, twenty feet.

Interior length of the cave from the entrance to the extremity, one hundred and forty feet.

Height of the talleſt columns on the right ſide of the entrance, forty-five feet.

Depth of the ſea in the interior part of the cave, ten feet nine inches; in ſome places eight feet, and towards the bottom ſomewhat leſs*.

I have given a deſcription of the largeſt cave, as it is at the ſame time the moſt remarkable. But there is another towards the northern part of the iſland, in the midſt of a fine

* All the dimenſions were taken with great exactneſs with a piece of thread-tape, painted and waxed, divided into French toiſes, feet and inches, and rolling up into a leather caſe. This inſtrument, which I cauſed to be made in London, afforded a meaſure of 100 feet. If I, therefore, differ in the leaſt from the dimenſions taken by Sir Joſeph Banks, attention muſt be had to the difference of the Engliſh foot. This naturaliſt, beſides, uſed a fiſhing line, which, ſtretching more or leſs with the wet, can never give the meaſures ſufficiently correct.

colonade. Its name in the Earſe language is *Oua-na-Scarve*. It is, however, leſs intereſting than the firſt, and was beſides inacceſſible at the time I viſited the iſland. There is alſo in the ſouthern quarter, and at a ſhort diſtance from the place where we diſembarked, a ſmall cave compoſed of compact lava, ſurmounted with a range of priſms, the total appearance of which, as is obſerved by Sir Joſeph Banks, exactly reſembles the keel of a veſſel having her timbers expoſed to view. The curvature of the priſms renders the reſemblance of this ſingular ſpectacle very ſtriking.

More than one half the circumference of the iſle is occupied by very handſome colonades, which are completely bare on the ſide next the ſea. They reſt in general on a current of gravelly lava, which ſerves for their baſis and ſupport; and they follow the direction more or leſs inclined, more or leſs horizontal of the current. All theſe priſmatic cauſeways are covered with a vaſt ſtream of lava, more or leſs compact, and tending more or leſs to a priſmatic form. The ſummit of this covering is ſpead over with a little vegetable earth formed by decompoſed lava, and with ſome thin common graſs.

Above

Above one half the iſland therefore is ſupported by columns more or leſs perpendicular, and the remaining part entirely conſiſts of lavas more or leſs compact, more or leſs decompoſed, more or leſs intermixed with fragments of other lavas, zeolitic infiltrations, calcareous ſtreaks, and calcedonious droppings, which have in ſome places penetrated the ſubſtance of the zeolites.

One of the cauſeways to the northward of the grand cave merits the attention of the naturaliſt by the diſpoſition, the number, the purity, and elevation of the priſms, which are more than forty-eight feet high, and placed perpendicularly like the pipes of an organ. This magnificent colonade is ſpread over with a current of compact lava, more than fifty feet thick, and compoſed of innumerable ſmall priſms which diverge in all directions. It is ſupported by a current of black gravelly lava, nine feet thick, the paſte of which is an intermixture of different other lavas divided into ſmall irregular fragments, and united by a natural cement, compoſed of calcareous earth, zeolites, and a calcedonious ſubſtance. Every thing leads me to regard this current as the reſult of a volcanic erup-

tion, in which the water entering into concourſe with fire, has mixed all theſe matters in one paſte. A part of this current of lava extends under the ſea.

To prevent my deſcription from becoming too tedious, I ſhall now only ſay a few words reſpecting what is improperly called the iſle of *Boo-ſha-la*; improperly, becauſe the name of iſle can never be given to what evidently forms an appendage of the principal iſle.

Boo-ſha-la lies at a ſmall diſtance from the grand cave, and is ſeparated from Staffa by a channel which is only a few fathoms wide; its junction with the latter may be eaſily traced in the ſea. Boo-ſha-la itſelf ſeems to be divided into two parts at ſpring tides. It is compoſed of a number of banks of priſmatic baſaltes of a very pure kind, piled together in ſome places, arched in others, and ſometimes diſpoſed in the manner of ſteps, which form a paſſable, though ſteep ſtair-caſe. By the ſide of this the columns are vertical, and form by their union and their different degrees of elevation, a regular conic peak, which is entirely an aſſemblage of priſms. This remarkable ſtructure is not owing to the falling of large maſſes from their former poſitions.

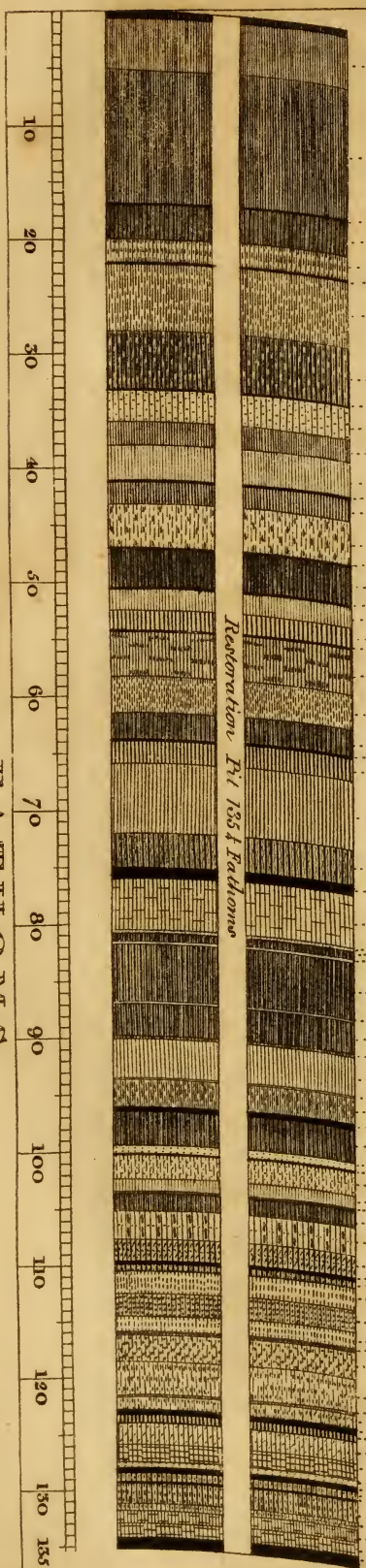
It

SECTION of the STRATA, to the LOW MAIN COAL,

At St. Anthon's Colliery,

near Newcastle upon Tyne.

The Property of George Johnson Esq.r & Co.



	Fath.s	Feet	Ins.
Soil & Clay	5	..	..
Brown Freestone	12	..	..
Coal	..	..	6
Blue Metal Stone	2	5	..
White Girdles	2	1	..
Coal	..	..	8
White & Grey Freestone	6	..	..
Soft Blue Metal Stone	5	..	..
Coal	..	..	6
Freestone Girdles	3	..	..
Whin	1	4	6
Strong Freestone	3	1	..
Coal	..	1	..
Soft Blue Thill	1	5	..
Soft Girdles mixed with Whin	3	5	..
Coal	..	..	6
Blue & Black Stone	3	4	..
Coal	..	..	8
Strong Freestone	1	3	..
Grey Metal Stone	1	4	..
Coal	..	..	8
Grey Post mixed with Whin	4	1	..
Grey Girdles	3	1	..
Blue & Black Stone	2	2	..
Coal	..	1	..
Grey Metal Stone	2	..	..
Strong Freestone	6	..	..
Black Metal Stone with hard Girdles	3	..	..
HIGH MAIN COAL	1	..	..
	76		
Grey Metal	4	3	..
Post Girdles	..	2	..
Blue Metal	..	4	..
Girdles	..	1	2
Blue Metal Stone	5	..	..
Post	..	1	..
Blue Metal Stone	3	..	..
Whin & Blue Metal	..	1	6
Strong Freestone	3	3	..
Brown Post with Water	..	..	7
Blue Metal Stone with Grey Girdles	2	2	..
Coal	..	3	..
Blue Metal Stone	3	..	3
Freestone	..	4	..
Coal	2	..	8
Strong Grey Metal with Post Girdles	1	1	..
Strong Freestone	1	1	..
Whin	1	2	7
Blue Metal Stone	2	4	5
Grey Metal Stone with Post Girdles	1	4	3
Blue Metal Stone with Whin Girdles	..	3	3
Coal	2	..	7
Blue Grey Metal	..	..	..
Freestone	2	..	..
Freestone mixed with Whin	1	2	2
Freestone	..	2	..
Dark Blue Metal & Coal	2	..	..
Grey Metal Stone & Girdles	3	..	7
Freestone mixed with Whin	1	1	3
Whin	..	4	10
Freestone mixed with Whin	1	..	..
Coal	..	3	..
Dark Grey Metal Stone	1	..	2
Grey Metal & Whin Girdles	..	3	9
Grey Metal & Girdles	1	..	..
Freestone	..	4	6
Coal	2	..	..
Blue & Grey Metal	..	4	6
Freestone mixed with Whin	1	..	9
Grey Metal	1	..	6
Grey Metal & Girdles	1	..	..
LOW MAIN COAL	..	..	6
Total	135	1	6

It ſeems rather to be the effect of a more or leſs gradual cooling; and the matter in ſhrinking appears to have undergone thoſe fantaſtic modifications and accidents, which may be obſerved in cryſtallizations on a large ſcale; though I am far from conſidering the priſmatic lava as the reſult of cryſtallization. On the contrary, I reject that opinion; and the compariſon which I uſe here is only for the purpoſe of making myſelf more intelligible, and has no relation but to the accidental varieties and different diſpoſitions of the forms.

Mr. Thomas Pennant has publiſhed, in his Tour to the Hebrides, two engavings of Boo-ſha-la, taken from the very correct drawings of Mr. Banks.

It remains only that I ſhould give a liſt of the lithological productions of the iſle of Staffa.

MINERALOGY OF THE ISLE OF STAFFA.

1. Triangular baſaltic priſms, which are here, as in other places, very rare.
2. Quadrangular, and equally rare.
3. Pentagonal: } Theſe are the moſt
4. Exagonal: } common forms.
5. Hepta-

5. Heptagonal, of which a few are found here.

6. Octogonal, of a large ſize, ſometimes four feet in diameter, exhibiting in their truncatures the elements of other ſmaller priſms.

7. Articulated priſms, that is, whoſe ſections are concave on one ſide and convex on the other.

8. Priſms cut ſtraight without any articulations, ſome of them have eight, ten, and even twelve ſections.

9. Priſms which ſeem to have been caſt at one time, in one piece; of theſe, ſome are twelve, fifteen, twenty, and even forty feet high.

10. Priſms curved in an arch of a circle.

11. Black gravelly compact lava, which eaſily ſeparates into irregular pieces.

12. Black porous lava. The extinguiſhed volcano, in the iſle of Staffa, has been expoſed for ſo many ages to the fury of a ſea full of currents, and agitated with tempeſts, that it may well be ſaid to have left only the ſkeleton of a volcanic iſle, much more conſiderable in former times; the ſea which attacks it on every ſide having carried away or deſtroyed

ſtroyed every thing that it was capable of acting upon. It ought not, therefore, to be a ſubject of wonder, that it contains neither the remains of a crater, nor ſcoriæ, nor light lavas. The ſame thing has happened to other extinct volcanos which the ſea abandoned, after an incalculable lapſe of ages. On examining, however, with attention the ſubſtances which compoſe the currents of lava, which ſupport many of the priſmatic cauſeways of the iſle, one diſcovers ſome fragments of a black porous lava. Theſe lavas being mixed and interſperſed among the fragments of other lavas, compact, pulverulent or gravelly, compreſſed by the enormous weight of the ſuperior maſſes, and united by a gluten, partly calcareous and partly zeolitic, are thence more protected from the action of the waves.

13. White radiated zeolites, incruſted with baſaltic lava. The ſame zeolites incruſted with black lava, much ſofter, in round pieces, oval or irregular, and in diverging points. There are ſometimes ſeen on the exterior part of theſe oval pieces, projecting cryſtals of cubical zeolites.

14. White

14. White radiated calcedonious zeolites. I obtained from one of the beds of muddy lava, on which the greater part of the prismatic lavas of Staffa repose, several spherical nuclei of zeolites in diverging rays, united to the number of three or four in one group. Several of these small balls were completely solvable in the nitrous acid, with which they formed a jelly; whilst several others adhering to these, but semi-transparent and of an unctuous polish, were impervious to the acid, and even gave sparks with steel. But on calcining and reducing the latter to powder, and digesting them in a glass vessel with nitrous acid in a sand bath, the acid dissolves the zeolites and forms a jelly with it, whilst the calcedonious particles remaining untouched, are precipitated to the bottom. I found some of these small balls of the size of a gall-nut, the one half of which was penetrated by a calcedonious milky juice, and the other by a quartzose juice extremely crystalline, and as transparent as the purest rock crystal.

15. Cubical white zeolites. There were some of the most superb pieces of cubical zeolites

lites in Staffa; but, in our viſit to that iſle, we took away all that were moſt intereſting. Before us, doctor Thompſon had alſo made at Staffa a very intereſting collection of zeolites, and among others, a number of large cubic cryſtals joined together on a black compact lava. This ſpecimen, the moſt conſiderable and the moſt perfect of its kind, may be ſeen at Oxford in the collection of that naturaliſt.

16. Tranſparent cubical zeolites, of a greeniſh caſt. I found this ſpecimen in the interior of the cave of Fingal, in a crevice formed by the ſeparation of two priſms. It is therefore very evident that this ſmall group of cubical cryſtals had been formed in that fiſſure in a very ſlow and inſenſible manner, by the juxta-poſition of the zeolitic particles held in ſolution by the aqueous fluid. The greeniſh colour of the latter zeolites is owing to the decompoſition of the iron contained in the baſaltes.

17. White ſemi-tranſparent zeolites in octagonal cryſtals.

18. White ſemi-tranſparent zeolites in cryſtals of thirty facettes.

Such are the moſt remarkable zeolites which I have found in the iſle of Staffa. It

is not improbable that the waves and currents which daily wear away its coaſts may afterwards diſcover ſome other varieties.

19. Granite of a red ground, and of the ſame texture with that of the ancient Egyptian granite, but of a much leſs vivid colour. This red granite is found in rounded ſtones of a pretty large ſize among the rolled lavas thrown by the ſea upon that part of the iſland where the currents have formed the moſt conſiderable breach. As every thing in Staffa is completely volcanic, it is evident that theſe blocks of granite, which are not very abundant, but which have been rounded by friction, have been tranſported from a diſtance by currents; for the neighbouring iſlands are equally volcanic. The ſea muſt certainly be terribly agitated to raiſe theſe rounded granites to the height at which they are found on the iſle of Staffa, among the baſaltic lavas equally rounded, which the ſea throws up during ſpring tides and furious tempeſts.

CHAPTER V.

Stay at Mr. M'Lean's.—Cuſtoms and Manners of the Inhabitants of the Iſle of Mull.

MR. M'LEAN of Torloiſk has erected a commodious habitation, in the modern ſtile, but without any parade. Its characteriſtic is an exquiſite neatneſs, joined to the moſt attractive ſimplicity.

It commands a view of the ſea, and the iſles of Ulva, Gommetra, Staffa, Iona, and numerous cluſters of rocks, which render navigation ſo dangerous in that region.

This houſe is ſituated on a ſingle flat eminence, deſtitute of trees and verdure; ſo that to form a ſmall kitchen garden, Mr. M'Lean has been obliged to dig away part of the volcanic rock, and fill up the area with tranſported ſoil; he ſhewed me ſeveral difficult and expenſive operations of this kind which he had executed. On my aſking, why he ſuffered to remain ſtanding upon the place a kind of large cottage built of dry ſtones, covered with ſtraw, or rather heath, and lighted

by

by two narrow holes, which ſcarcely admitted the rays of the ſun.

"It was there," ſaid Mr. M'Lean with emotion, "that I was born. That is the "ancient habitation of my fathers; and I feel "unexpreſſible regard for this modeſt manſion, "which reminds me of their virtues and "frugal life." This reply more ſtrongly marks the character of that eſtimable man than the moſt eloquent deſcription which I could give. It ought to be remarked, that Mr. M'Lean is a man of birth and fortune, that he has ſerved in the Britiſh army, performed diſtant voyages, and is well acquainted with the world. He has, notwithſtanding, preferred his native ſoil, and an agricultural life, to a reſidence in London or Edinburgh, or the moſt fertile plains of England; ſo powerful is the dominion of our firſt habits, when it recals to our minds the indelible pleaſures of infancy.

Several ladies from Edinburgh, of agreeable converſation, were at Torloiſk at the ſame time with me. One of them, a relation of the Melforts, of whom there is a branch ſettled in France, was a woman of talents and information. A young officer, nephew to Mr.

Mr. M'Lean, and two of his friends, were alſo on a viſit at Torloiſk; where all were united in the delightful bonds of confidence and friendſhip.

Miſs M'Lean was an only daughter, of a pleaſing countenance, elegant figure, and highly intereſting from her talents, her acquirements, and her modeſty. She played extremely well upon the harpſicord, and was in every reſpect the charm of that happy ſociety. She had attentively ſtudied the language, poetry, and muſic of the Hebridians.

Miſs M'Lean aſſured me, in ſeveral converſations, with which ſhe favoured me upon the ſubject, that to one acquainted with the language, the uſages, and the manners of the country, it was difficult to conceive how the Engliſh writers, who were utter ſtrangers to the Celtic tongue, ſhould have ſo obſtinately perſiſted in doubting the exiſtence of the ancient poems of Oſſian. She admitted, that they are in many places incomplete, and in others altered; for it cannot be ſuppoſed that they have not ſuſtained ſome loſs in their tranſmiſſion from bard to bard, and from one generation to another. But it is nevertheleſs true, that ſeveral pieces of them have

come down entire, accompanied with ſome remains of the muſic to which they have been ſung. This muſic is indeed wild and rude when compared to ours, but poſſeſſes the moſt powerful charms for the Highlanders, by calling to their minds the combats, victories, loves, and illuſtrious actions of their heroic anceſtors.

No one is more capable of converting thoſe who are incredulous upon this point than Miſs M'Lean, and I invite her in the name of the ſiſter arts, of poetry and muſic, with which ſhe is ſo well acquainted, to publiſh her reſearches reſpecting the poems and airs of the ancient Caledonians *.

Mr. M'Lean's domeſtics, both men and women, are clothed in the Hebridian mode.

* Beſides what M'Pherſon has ſaid upon the ſubject, John Smith, miniſter of Kilbrundon in Argyleſhire, has written in favour of the authenticity of the poems of Oſſian, Ullin, Onan, &c. Mr. Nichol, of Liſemore, has alſo treated the ſame ſubject. John Clarke, of Edinburgh, has given a tranſlation of ſeveral of the Caledonian bards. I purchaſed alſo at Edinburgh a collection of Galic muſic, publiſhed by a preſbyterian miniſter, and ſeveral other printed and manuſcript pieces relative to this queſtion; which I can communicate to ſuch as it particularly intereſts. But this great queſtion being foreign to the principal object of my reſearches, I ſhall forbear to expatiate upon it in this place.

I have

I have already deſcribed the dreſs of the men, in mentioning the inhabitants of Dalmally. That of the women is much leſs complex. Their long flowing hair, which is in general black, forms the only ornament of their heads. Some indeed have it kept back with a ſimple woollen fillet ſtriped of different colours, among which red and green are invariably predominant. From one article of expence they are entirely free: they wear neither ſhoes nor ſtockings. But notwithſtanding the length of the winter, and the inceſſant humidity of the climate, and though they go with their heads bare, their teeth do not ſeem to be in the leaſt affected. Their dreſs conſiſts of a bodice, or rather a kind of veſt, and a petticoat of a woollen ſtuff chequered with red, green and brown ſtripes, ſhaded with blue. This is the general and favourite clothing of the Highlanders, and is uſed alike by the men and women, though it is for the moſt part manufactured in the ſouthern parts of Scotland. It is known by the name of *Tartan.*

The Engliſh eat very little bread; the Scots eat more: there were three different kinds uſed at Mr. M'Lean's table.

The firſt, which may be regarded as a luxury for the country, is ſea biſcuit, which veſſels from Glaſgow ſometimes leave in paſſing.

The ſecond is made of oatmeal formed into an unleavened dough, and then ſpread with a rolling pin into round cakes, about a foot in diameter and the twelfth part of an inch thick. Theſe cakes are baked, or rather dried, on a thin plate of iron which is ſuſpended over the fire. This is the principal bread of ſuch as are in eaſy circumſtances.

The third kind, which is ſpecially appropriated to tea and breakfaſt, in the opulent families of the iſles, conſiſts of barley cakes, without leaven, and prepared in the ſame manner as the preceding, but ſo thin, that after ſpreading them over with butter, they are eaſily doubled into ſeveral folds; which render them very agreeable to thoſe who are fond of this kind of dainties.

At ten in the morning, the bell announces that breakfaſt is on the table. All repair to the parlour, where they find a fire of peat, mixed with pit-coal, and a table elegantly ſerved up and covered with the following articles:—

Plates.

Plates of ſmoaked beef,
Cheeſe of the country and Engliſh cheeſe, in trays of mahogany,
Freſh eggs,
Salted herring,
Butter,
Milk and cream,
A ſort of *bouillie*, of oatmeal and water. In eating this *bouillie*, each ſpoonful is plunged into a baſon of cream, which is always beſide it.
Milk worked up with the yolks of eggs, ſugar and rum. This ſingular mixture is drank cold, and without being prepared by fire;
Current jelly,
Conſerve of myrtle, a wild fruit that grows among the heath,
Tea,
Coffee,
The three ſorts of bread above-mentioned; and, Jamaica Rum.

Such is the ſtyle in which Mr. M'Lean's breakfaſt-table was ſerved up every morning, while we were at his houſe. There was always the ſame abundance, with no other dif-

ference in general than in the greater or leſs variety of the diſhes *.

Dinner is put on the table at four o'clock. It conſiſts in general of the following particulars, which I correctly noted in my journal.

1. A large diſh of Scotch ſoup, compoſed of broth of beef, mutton, and ſometimes fowl, mixed with a little oatmeal, onions, parſley, and a conſiderable quantity of peaſe. Inſtead of ſlices of bread, as in France, ſmall ſlices of mutton and the giblets of fowls are thrown into this ſoup.

* Knox, who travelled more upon the main land than in the iſlands, gives the following particulars of the breakfaſts of the more wealthy families:—

"A dram of whiskey, gin, rum, or brandy, plain or "infuſed with berries that grow among the heath; French "rolls; oat and barley bread; tea and coffee; honey in the "comb, red and black current jellies; marmalade, con- "ſerves and excellent cream; fine flavoured butter, "freſh and ſalted; Cheſhire and Highland cheeſe, the laſt "very indifferent; a plateful of very freſh eggs; freſh and "ſalted herrings broiled; ditto, haddocks and whitings, "the skin being taken off; cold round of veniſon, beef "and mutton hams. Beſides theſe articles, which are "commonly placed on the table at once, there are gene- "rally cold beef and moor-fowl to thoſe who chooſe to "call for them. After breakfaſt, the men amuſe them- "ſelves with the gun, fiſhing, or ſailing, till the evening; "when they dine, which meal ſerves with ſome families "for ſupper."

2. Pudding

2. Pudding of bullock's blood and barley meal, ſeaſoned with plenty of pepper and ginger.

3. Excellent beef-ſteaks broiled.

4. Roaſted mutton of the beſt quality.

5. Potatoes done in the juice of the mutton.

6. Sometimes heath-cocks, wood-cocks or water-fowl.

7. Cucumbers and ginger pickled with vinegar.

8. Milk prepared in a variety of ways.

9. Cream and Madeira wine.

10. Pudding made of barley-meal, cream, and currants of Corinth, done up with ſuet.

All theſe various diſhes appear on the table at the ſame time; the miſtreſs of the houſe preſides, and ſerves all round.

In a very ſhort time the toaſts commence; it is the buſineſs of the miſtreſs to begin the ceremony. A large glaſs filled with port-wine is put into her hand; ſhe drinks to the health of all the company, and paſſes it to one of the perſons who ſit next to her; and it thus proceeds from one to another round the whole table.

The ſide-board is furniſhed with three large glaſſes of a ſimilar kind; of which one is ap-

propriated to beer, another to wine, and the third to water, when it is called for in its unmixed ſtate, which is not often. Theſe glaſſes are common to all at table; they are never rinſed, but merely wiped with a fine towel after each perſon drinks.

The deſſert, from the want of fruit, conſiſts for the moſt part, only of two ſorts of cheeſe, that of Cheſhire, and what is made in the country itſelf.

The cloth is removed after the deſſert, and a table of well poliſhed mahogany, appears in all its luſtre. It is ſoon covered with elegant glaſs decanters of Engliſh manufacture, containing port, cherry, and Madeira wines, and with capacious bowls filled with punch. Small glaſſes are then profuſely diſtributed to every one.

In England, the ladies leave table the moment the toaſts begin. The cuſtom is not preciſely the ſame here; they remain at leaſt half an hour after, and juſtly partake in the feſtivity of a ſcene, in which formality being laid aſide, Scottiſh frankneſs and kindneſs have full room to diſplay themſelves. It is certain that the men are benefited by this intercouſe, and the ladies are nothing the loſers by it.

At

At Mr. M'Lean's we drank in particular to each of the ladies preſent.

To the reſt of the gueſts, mentioning their names one by one.

To the country.

To liberty.

To the happineſs of mankind in general.

To friendſhip.

We, foreigners, drank more than once to our good friends the Highlanders; and the company anſwered in full chorus with drinking to our friends in France, and in a lower tone, with a glaſs of mild Madeira, to our miſtreſſes.

The ladies then left us for a little to prepare the tea. They returned in about half an hour after; and the ſervants followed them with coffee, ſmall tarts, butter, milk, and tea. Muſic, converſation, reading the news, though a little old by the time they reach this, and walking, when the weather permits, fill up the remainder of the evening; and thus the time paſſes quickly away. But it is ſomewhat unpleaſant to be obliged to take one's ſeat at table again about ten o'clock, and remain until mid-night over a ſupper nearly of the ſame fare as the dinner, and in no leſs abundance.

Such

Such is the life which the richer claſſes lead in a country, where there is not even a road, where not a tree is to be ſeen, the mountains being covered only with heath, where it rains for eight months of the year, and where the ſea is in a ſtate of perpetual convulſion.

The winter is cold only about two months in the Hebrides, and the ſnow lies but a very little time on the ground, but, as tempeſts and rains prevail during the greater part of the year, neither wheat nor rye can be brought to perfection in them. Barley and oats, however, thrive here, and are reaped in the month of October, though it is neceſſary to dry the grain in kilns to prevent it from ſhooting, and to prepare it for being ground.

The greateſt part of the barley is fermented and diſtilled, to procure a ſpirituous liquor which forms their choice delight. It is called whiskey. Oatmeal is made into cakes for bread.

The iſle of Mull is not much more than from twenty to twenty-two miles long, and fifteen or ſixteen broad; a mile is termed in the Hebrides *ſcoc*. There is nothing like a regular village in the whole iſland; the houſes being

being almoſt always ſcattered apart, both on the coaſt and in the interior. They are conſtructed of irregular blocks of baſaltes ranged, without great attention to order, in walls of great thickneſs; for materials of this kind are very plentiful, and always within reach of the builders. The height of the walls ſcarcely exceeds five feet, and that of the entrance is ſeldom above three feet. The more wealthy iſlanders, adapt a door to it; but the greater part of the inhabitants are ſatisfied to do without any. The roof is often covered with thin pieces of ſtone, which is again laid over with turfs. But thoſe who can procure a ſufficiency of wood for laths uſe a thatch of heath or oaten ſtraw, faſtened and kept down by long ropes of heath to protect it from the impetuoſity of the winds.

The fire-place is always in the middle of the hut, and the ſmoke eſcapes by a hole in the roof, which is a little to one ſide, that the rain may not extinguiſh the fire. The Eſquimaux and Laplanders diſplay much more art and induſtry in providing themſelves with habitations.

The iſlanders of Mull go both bare-footed and bare-headed, without any regard to rain

or froſt. The father of a family may ſometimes have a Scottiſh bonnet, and the married women a head-dreſs of coarſe linen. But all the young folks, both girls and boys, go about with their heads bare, and without ſhoes or ſtockings. It ſhould be remembered that I am ſpeaking of the common claſs of people.

Almoſt all are ſhepherds or fiſhers. Each family has a ſmall ſpot on which they raiſe ſome barley, oats, and potatoes; which latter, with milk, forms their principal aliment. Thoſe on the ſea coaſt, or by the ſide of lakes, ſupply themſelves with fiſh. They catch ſalmon, which they dry in the ſmoak, and herrings, which they ſell, and ſometimes make into oil for their lamps.

Thoſe who are better informed, or of a more adventurous ſpirit, enter into the Engliſh navy, and form robuſt, ſober ſailors, familiarly acquainted with all the dangers of the ſea.

The population of the iſland is about ſeven thouſand.

It contains three pariſhes, nine regular built ſtone houſes, and five ſchools; its inhabitants profeſs the Preſbyterian religion.

The

The women, in general, are ſmall, ugly, and ill made; the natural conſequence of toil, bad food, the want of ſuitable clothing, and the inclemency of the climate. I ſaw two or three who were a little better looked, and whoſe figure was even ſomewhat agreeable, but theſe belonged to families in a more comfortable condition. The ſun being almoſt always covered with clouds, or enveloped in miſts, their skin would be very white, were it not diſcoloured by the peat-ſmoke, which, from the want of chimnies, continually fills their huts.

Notwithſtanding the wetneſs of the climate, I could never perceive that the cuſtom of going bare-headed was injurious to the teeth. Both men and women have very fine ſets, and are in general, eſpecially the men, very healthy. The diſorders which might be expected to ariſe from the frequent rains of this climate, are mitigated by the extreme temperance of their life, exerciſe, and the purity of the air. Their only ſuſtenance conſiſts of milk, potatoes, fiſh at certain times of the year, and oatmeal made into a *bouillie* or cakes. Their beverage is pure water; and a few glaſsful's of whiskey on

their

their feſtive days conſtitutes their ſupreme happineſs.

On enquiring reſpecting the age of their oldeſt men, Mr. M'Lean of Torloisk aſſured me, that a man of his acquaintance who reſided in the neighbourhood of Aros, had died about ſeven years before at the advanced age of one hundred and ſixteen years, and that there were ſeveral living above eighty; among thoſe, however, it ſhould be remarked, who were in commodious circumſtances.

The horſes of the iſland are of a very diminitive race; its black cattle are equally ſmall, but very delicate when fattened; they are generally exported to England, and they form one of the principal revenues of the iſle of Mull. There are alſo in it two kinds of ſheep which I ſhall ſoon deſcribe, and a few goats; but there are no hogs, and only a few fowls, owing to the difficulty of feeding them. At Aros, in a houſe by the waterſide, I ſaw ſome geeſe and ducks, and three turkies; but the heads of the latter were pale, and I doubt whether they will thrive there.

The

The higheſt mountains produce deer, though few in numb r, and of a ſmaller ſize than the common kind. Heath-cock, of the greater and leſſer ſpecies, are very plentiful; there are alſo ſome wood-cocks, but no hares. The only ſmall bird which I ſaw in my courſe through it was, the ortolan.

The iſland is now denuded of trees, though formerly it muſt have been covered with them. This may be eaſily ſeen by the turberies; on digging which to a certain depth, it rarely happens that roots and ſtumps of beech, pine, and birch are not met with. It is my opinion that were the proprietors to give themſelves the trouble of planting evergreens and birches, they would ſtill thrive there. In this opinion I am confirmed from a ſmall thicket which I ſaw at *Achnacregs*, on the extremity of the iſle oppoſite to that of Torloiſk.

The level country and the mountains are in general covered with heath and ſod.

The tides riſe to a great height in this part, and the ſhores abound with ſea wreck, which has for ſome time back been burnt for its alkali, which ſome of the merchants of Glaſgow come to purchaſe. But this uſeful

object

object of induſtry is excluſively engroſſed by the *lairds*, or a few wealthy perſons. The ſea wreck, when freſh, is uſed with ſucceſs as a manure.

There are yearly exported from Mull about fifteen hundred head of black cattle; but, from their ſmall ſize, they bring only about three pounds ſterling each.

OF THE SHEEP OF SCOTLAND, PARTICULARLY THOSE OF THE ISLE OF MULL.

I ſhall here give an account, in as few words as poſſible, of the information which the beſt local opportunities enabled me to procure upon this ſubject, with the intention of being uſeful to thoſe, who occupy themſelves with this great branch of national economy.

In the mountains of Scotland, and the Hebrides, there are only two kinds of ſheep; the original race of the country, and a kind which has been introduced from England, and which is accordingly called *Engliſh ſheep*.

The wool of the former, or Scottiſh ſheep, is much ſuperior to that of the Engliſh ſheep, and even approaches the Spaniſh wool in fineneſs

neſs. But many people prefer the Engliſh kind becauſe they yield a fleece double that of the Scottiſh race, are fatter and fuller of fleſh. They accordingly ſell at a much higher price.

An Engliſh ſheep, in good condition, ſells upon the ſpot, for half a guinea and often twelve ſhillings; whilſt a Scottiſh one ſeldom brings above ſix or ſeven ſhillings.

The wool is ſold here by a weight of twenty-four pounds, denominated a ſtone; this quantity is generally valued at from ſix to ſeven ſhillings. The pound contains ſixteen ounces.

The flocks of ſheep range the mountains or valleys, both night and day, ſummer and winter, without any ſhelter; yet the extreme wetneſs of the climate does not ſeem to do them the leaſt injury.

They never have any fodder during the winter, not even when there is ſnow; but it ſhould be obſerved, that, in theſe iſles, though in ſo northern a latitude, the ſnow does not continue long on the ground. By a very rare occurrence, in the winter of 1783, it remained upon it about two months; during which time, the ſheep fed upon the tops of a

tall kind of broom which remained above the ſnow. The poor animals, however, ſuffered ſeverely during that winter, and became very meagre. But a much greater number of them died from accident, than from want or diſeaſe; and on the reappearance of the graſs they recruited very faſt, and fattened as uſual.

The rams are carefully ſeparated from the ewes in the month of September, and are not admitted among them again till the twentieth of November, that the lambs may be yeaned only in the beſt ſeaſon.

The ewe brings forth and takes care of her lamb without any aſſiſtance. The ſhepherd, who, from time to time, viſits his numerous flocks, to prevent them from ſtraying too far, or endangering themſelves amidſt the rocky precipices, takes the number of the young lambs, who ſoon run after their dams and crop the new ſprung herb.

In the third month after parturition the lambs are taken away from their mothers, being then ſtrong enough to do without them, and are formed into flocks which are put into ſeparate encloſures, under the care of a keeper.

When

When the paſture grounds are contiguous and of great extent, one man and two dogs are ſufficient to keep fifteen hundred ſheep. But when the paſtures are of inconſiderable extent, and it is neceſſary that they ſhould feed more regularly, a keeper and two dogs are requiſite for every eight hundred.

Nineteen or twenty rams are ſufficient for eight hundred ewes. The keeper repairs every evening to a cottage in the form of a dwelling-houſe, erected in the midſt of the paſture ground.

The only diſorders to which the ſheep are ſubject here, are the pleuriſy, which happens but ſeldom, and the ſtaggers, which turns their heads to one ſide, and always ends in their death. This diſeaſe is unfortunately very frequent, and often attacks thoſe which appear to be the moſt healthy *.

The

* This diſeaſe is the ſame as that known in Tuſcany by the name of *Pazzia*. The animals affected with it, and which are called in France *moutons lourds*, *moutons imbecilles*, waddle in their walk. Abbe Fontana, in a letter upon this ſubject addreſſed to M. Darcet, and inſerted in the *Journal de phyſique*, tom. i. page 227, 1784, ſays, "it is "very remarkable that the ſheep attacked by it, generally "fall on one ſide, and that the veſicle, which occaſions it "is found to be in the lobe of the brain oppoſite to the "ſide on which they fall. This obſervation holds good

The Hebridians never give any ſalt to their ſheep; they are not however ignorant of its good effect; but their flocks being very numerous, and the ſalt, from government duties and carriage, extremely dear, the expence would be too great for their abilities. Were it not for this hindrance, the inhabitants would undoubtedly uſe it for the fleecy race; for they are very ſenſible that the cows and oxen, who feed upon the herbs waſhed by the ſea, thrive well, become plump, and have a ſleek ſkin.

Here I ought to mention a cuſtom uſed in ſeveral parts of the north of Scotland, particularly in the lower diſtricts, though it is not practiſed in the Hebrides or more inland parts of the Highlands, I mean that of ſmearing their ſheep with tar.

" in all caſes; and the animals conſtantly fall on the ſame " ſide." The celebrated phyſician of Tuſcany, from ſeveral microſcopic experiments on the liquor contained in theſe veſicles or *idatides* in the brain of ſheep, concludes, that " the particles, which are ſeen floating in that liquor, are " *real animalcules.*" This new and ſingular diſcovery, ſays that learned philoſopher, " may throw light on ſome " diſorders of the human brain, and even on inſanity; ſince " veſicles as large as a pea, and ſometimes larger, have been " found in the brains of perſons who have died of that ma- " lady, which is ſo terrible and humiliating to human va- " nity," page 231 of the ſame paper.

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The owners of the numerous flocks of theſe diſtricts, where the winter is far ſeverer than in the Hebrides, entertain an opinion that the intenſe cold makes the ſheep ſcabby; and as a ſecurity againſt this, they make uſe of the following preſervative:

In the month of November each ſhepherd takes two barrels of tar and one barrel of butter; or a greater quantity of each, according to the number of the flock, but always in the proportion of two-thirds of tar to one-third of butter. Theſe two ſubſtances are then boiled or melted together; and after being completely mixed and permitted to cool, each ſheep is tied up by the feet, ſtretched on a hurdle, and rubbed over with the compoſition. This operation is performed by ſeparating the wool into thin flakes that the tar may be applied to the skin with as little injury as poſſible to the fleece.

According to the opinion of the ſheep-farmers of the country, two advantages reſult from this practice. The firſt is, the preſerving of the cattle in a ſtate of health; the ſecond, that of making them yield a greater

quantity of wool. The moſt wealthy ſheep-farmers, whom I had an opportunity of conſulting upon the ſubject, aſſured me, that the fleece was certainly more abundant when the ſheep were tarred; but they, at the ſame time ſtated, that it ſells for nearly one-half leſs than unſmeared wool, being rendered a great deal heavier than its real weight, by the dirt which adheres to the tar. The operation by which the tar may be taken off, conſiſts in ſoaking the fleece after it is ſhorn in warm-water, into which butter has been melted. But this proceſs muſt be expenſive; and the wool never reaches the quality of its natural ſtate.

Five thouſand ſheep require twenty barrels of tar, and one-third that quantity of butter. This expence appears at firſt much more conſiderable than it really is; for, on dividing it among five thouſand, it does not amount to five *ſols* a-head. Beſides, this compoſition of butter and tar gives the ſheep a ſort of artificial fat, which ſupplies what the rigour of the climate deprives them of; and if it tends to keep theſe uſeful animals in better health, and alſo to encreaſe the quan-

tity

tity of their wool, however ridiculous, expenſive or difficult to thoſe unaccuſtomed to it, the practice may at firſt appear, it is yet, perhaps, worthy of profound attention and examination on the part of thoſe who are particularly intereſted in this important branch of economy.

CHAPTER VI.

Departure from Torloiſk.—Stay at Aros.—Viſit to two worthy Farmers and Brothers, the Stuarts of Aros.—Excurſion to the Mountain of Benmore, the higheſt in the Iſle of Mull.—Stop at Mr. Campbel's, of Knock.—His agricultural Operations.—Curious Lavas.—Departure from Aros for Achnacregs.

I WAS treated with ſuch engaging marks of politeneſs and affection by Mr. M'Lean and all his family, as well as by his viſitors, that it was impoſſible for me to leave them without feeling a ſentiment of gratitude and regret. I ſhould be happy to prove to them that they will never fade from my remembrance. This reſpectable philoſopher kindly accompanied us for ſeveral miles on our return.

During my ſtay at Mr. L'Lean's I took a ſurvey of the volcanic hills in his vicinity, and directed my reſearches to the right and left of his houſe, along a tract of coaſt which the waves have waſhed into naked precipices capable

capable of affording a complete view of the ſtructure of ſubſtances formerly acted upon by ſubterraneous fire. I ſhall give a deſcription of them in the chapter appropriated to the mineralogy of the iſle of Mull.

We ſet off, mounted upon little half-wild horſes, and on the ſame day reached Aros. Here we remained the whole of next day in a very uncomfortable lodging, where we found only ſome barley meal, which was made into pottage for us with milk, a little ſmoke-dried ſalmon, and a few ſheep-trotters; no wine nor beer; but whiſky, which ſcalded our mouths, and, to crown all, our beds were of the very worſt kind. Our hoſt, however, was a good ſort of man, and uſed every poſſible exertion for our accommodation. With this we expreſſed ourſelves ſatisfied for the preſent; and he promiſed to procure us ſome freſh fiſh by the next morning.

Of theſe, two of my companions were left to enjoy the benefit, for I had determined myſelf to ſet out with the firſt dawn to viſit the high mountain of Benmore, and William Thornton, who now felt an increaſed ardour for the purſuits of Natural Hiſtory, reſolved to accompany me.

There

There are not much more than three miles from Aros to Knock, along a pretty good road, which here and there preſents ſome pictureſque landſcapes, of an appearance, however, ſomewhat wild.

On a meadow in the bottom of a narrow valley, waſhed by the ſea, we obſerved one of thoſe columns called *Cairns*, of which, from the ground being overflowed at the time, I was unable to procure the dimenſions. But as near as I could judge by the eye, it might be about fourteen or fifteen feet in height, and ſeemed to conſiſt of grit ſtone. There is certainly ſomething aſtoniſhing in the frequency of theſe ancient monuments through the Hebrides and the main land of Scotland. Popular tradition traces every one of them back to the time of Oſſian, which is merely to ſay, that their origin has been loſt in the lapſe of ages.

The houſe of Mr. Campbel, of Knock, is very agreeably ſituated at the foot of a high mountain, and not far from an arm of the ſea, very plentiful in fiſh. Mr. Campbel was gone at this time to Oban, but the miſtreſs of the houſe received us in the moſt affable manner, and treated us with tea and rum.

We

We requeſted that ſhe would procure us a guide to direct our way to the top of Benmore; but her ſon, a youth of ſeventeen or eighteen years old, offered to accompany us himſelf. This young man, who had a very agreeable figure, and was dreſſed in the Hebridian ſtile, immediately preſented us with fowling-pieces, ſaying, that he had excellent dogs, and that we ſhould certainly find ſome *black-cocks*; for he had no conception that we could wiſh to climb ſo rugged a mountain, for any other purpoſe than the pleaſures of the chace, which he paſſionately loved himſelf. He was, therefore, much ſurpriſed when I took out my hammers, and told him, that I had come to examine the ſtones of the place On receiving that information, he ſhewed us immenſe heaps of them which had been taken off a conſiderable tract which his father had cleared in the midſt of ſome lavas. All theſe ſtones, broken into ſmall lumps, were afterwards uſed to form encloſures to a piece of ground which required much labour, time and expence, to reclaim. A larger collection of lavas is ſeldom met with than this preſented. I ſhall preſently mention its particulars.

As

As we intended to return to Aros in the evening, we loſt no time in beginning to ſcale the ſteep ſides of Benmore. In my travels among the high Alps I never experienced ſo much difficulty as in this aſcent. An almoſt impenetrable heath, growing upon a marſhy ſoil, covers the baſis, the middle and the ſummit of the mountain, which riſes in the ſhape of a ſugar loaf. It is impoſſible to make any progreſs, but by following the ſmall gullies which the waters have worn, and walking in the very midſt of the ſlender ſtreams, which occupy the bottom of theſe ſteep and narrow paths. The black and buſhy heath ſpreads its gloomy veil over thoſe ſtones, which might intereſt and repay the fatigues of the naturaliſt. Not a ſingle plant, nor ſo much as a tuft of moſs is to be ſeen, every thing is here ſmothered by its deſtructive progreſs.

The ſtones which the moſt conſiderable gullies have uncovered, and thoſe which have been broken off by froſt, are all volcanic. But they preſent no variety; all of them are whitiſh-grey lavas, ſlightly maculated with zeolite.

We had reached to a conſiderable height, when, wearied with ſeeing only the ſame lavas,

lavas, and meeting with no other plant than the toilſome heath, whence ſtarted from time to time ſome black-cocks, which young Campbel brought to the ground with great dexterity, I reſolved to go no farther. But William Thornton braving every difficulty and deſirous to gain the higheſt ſummit, proceeded onward. The ſtones which he brought down with him afforded no variety. Upon the whole, the mountain of Benmore, notwithſtanding its height, and a kind of reſemblance which it has at a diſtance to mount Veſuvius, does not repay the trouble of aſcending it. We gladly returned therefore to reſt ourſelves at Knock, where the lavas being much more intereſting, I made a collection of ſome ſpecimens. We then took leave of young Campbel and his mother, notwithſtanding their preſſing ſolicitations to ſtop, and proceeded for Aros, where we were expected.

It was determined that we ſhould ſet off for Achnacregs at ten next morning. This was a diſtance of eighteen or twenty miles, which we willingly performed by land, as we ſhould thus have an opportunity of examining that part of the iſland, and at the ſame time avoid the navigation of the tempeſtuous ſound of Mull;

for

for from Achnacregs we could next morning eaſily reach Oban to breakfaſt.

We left Aros at the appointed hour; but firſt had the pleaſure of breakfaſting, by invitation, with the Meſſrs. Stuarts of Aros.

Theſe two gentlemen, who are brothers, occupy a commodious habitation on a ſmall hill, which they have brought into cultivation, and rendered productive of paſturage, barley, oats, and potatoes. In that modeſt aſylum, free from care and diſturbance, they paſs away their days with a happineſs which ambition has never taſted. Two intelligent and induſtrious ſiſters partake with them in the management of their houſehold affairs. Here they enjoy all the gentle delight of rural life; I ſincerely wiſh that they only lived under a more favourable ſky, and on a ſoil capable of exerciſing their agricultural taſte and talents to more advantage.

We took leave of them at ten in the morning of the 29th of November.

A few miles from Aros, near the waterſide, we obſerved the ruins of a catholic chapel, where are ſtill viſible a gothic baſſo-relievo in freeſtone, repreſenting the Virgin Mary between two ſeraphims, and a large grave-

grave-ſtone which exhibits the effigy of a warrior in complete armour, that is, with helmet, bracelet, cuiſhes, buckler, and ſword. One of our guides told us, that it was the figure of a hero of the clan of M'Lean. Beſide this ſepulchral relic, we obſerved another repreſenting alſo in relievo, a woman of tall ſtature, dreſſed in the gothic ſtyle of the ancient ladies of France. The name of the place where we diſcovered theſe ruins is *Galchayle.*

Thence we continued our courſe along a way, which might be called rather a path than a road, to *Lenigorn*, *Ardmitrail*, and *Corinahiniſh.* It muſt not be ſuppoſed that all theſe names indicate villages, or even hamlets. Alas! they are applied only to ſome huts, ſcattered at diſtant intervals amidſt theſe diſmal deſerts.

Every thing along this road is volcanic; but the compact homogeneous grey-coloured lavas which it preſents, are not very intereſting. They are beſides ſo thickly covered with moſs or lichens, that it is neceſſary to break them before they can be diſtinguiſhed.

In the vicinity of *Ledkirk*, however, I found ſome hard compact lava, diſpoſed in

ſlabs,

ſlabs, which gave me conſiderable pleaſure. This lava was of a white kind; and at firſt ſight might be taken for a fine limeſtone of that colour. But on a more attentive examination, its vitreous appearance proves beyond doubt that it is merely a baſaltic lava bleached by its contiguity to ſome crater, or by remaining long in a fluid impregnated with ſome acid. It is remarkable that theſe lavas have preſerved their magnetic property. I collected ſome ſpecimens to compare them with ſome of the ſame kind which I found on Mount Mezinc, in Vivarais, and to thoſe of the extinct volcanos in the environs of Padua, and of the Euganean mountains.

From Ledkirk we paſſed on to *Garmony*, and thence to *Scallaſdel*, leaving the little fort of Duard on our left. On a green riſing ground, near Scallaſdel, we ſaw a druidical circle, formed of very large pieces of rough granite. We ſtopped for a moment to examine this altar or temple; but quitted it haſtily and with indignation, on reflecting that here the cruel prieſts, of a ſtill more cruel religion, had, perhaps, ſacrificed ſome Iphigenia, thrown by a tempeſt upon this new Taurica.

We

We arrived in the evening at Achnacregs. This is the name of a ſmall creek, where there is only one houſe, wretched and ſmoky, of two ſtories however, and with chimnies. From its firſt appearance, it was difficult to know whether it was a farm-houſe or an inn; we found that it was both the one and the other. The arm of the ſea which ſeparates this part of the iſle of Mull from Oban, the oppoſite point of the main land of Scotland, being of inconſiderable breadth, the paſſage is much frequented for the tranſportation of cattle; and this houſe affords ſhelter to thoſe who are driven in by bad weather, or who come to the iſland on commercial purſuits. Our entertainment here was in the ſtyle of Hebridian frugality; but, our landlord was a good ſort of man, very inquiſitive after news, ſomewhat of an antiquary, and had as much veneration for Fingal and Oſſian, as the Jews have for Moſes.

A heavy rain detained us within doors the whole of next day; I employed the time, therefore, in ticketing my ſpecimens, and arranging my journal.

On the ſucceeding day, the rain was not ſo thick and frequent, but the ſea was very boiſterous. We made ſome excurſions in

the vicinity; and about half a mile from our lodging obſerved a bank of lime-ſtone adjoining a bed of free-ſtone, and both of them incloſed in a current of lava.

At a ſhort diſtance from this bank, we came to a large rough column of free-ſtone, lying flat on the ground, and broken in the middle. On meaſuring, I found it to be twenty-one feet long. Our hoſt, who accompanied us at this time, did not fail to excite our admiration of this ancient monument. "Never was there a perſon, except "Oſſian," ſaid he, "who could move this enor-"mous ſtone. The operation of time, or per-"haps an earthquake has overthrown it, and "now there is not one in the iſland who can "ſet it up again."

It rained all the morning of the following day; but towards the evening it became fair for a little. Count Andreani, who began to be weary of ſo diſmal a ſolitude, and ſo bad a lodging, reſolved to take advantage of this ſhort interval, to croſs over to Oban, where he ſhould wait our arrival. The only veſſel which the place afforded, was a ſmall ſkiff, very badly equipped, and rowed by two boys, of whom the eldeſt was not more than fourteen years. The wind was variable, and the

the ſea not very ſmooth. In vain, however, did I repreſent to him that it were better to wait till the next morning; nothing could prevail on him to ſtop. He ſet off in the ſkiff, with his two ſervants, at half paſt four, telling us, that he ſhould ſleep in a good bed, and eat a better ſupper than we, at the houſe of the brothers Stevenſons, of Oban, where he expected to arrive by ſeven the ſame evening.

Leſs adventurous, though perhaps more prudent, than Andreani, I perſuaded William Thornton to remain with me at Achnacregs, till the ſea became more moderate. After wiſhing our friend a good paſſage, and looking after him as far as we could ſee him, we ſlowly returned to our wretched and dreary habitation. I wrote till eight; we then ſupped, and I went to bed at ten.

The wind by this time increaſed to a violent gale, accompanied with a great deal of rain; but I was nowiſe anxious reſpecting the ſituation of my companion, whom I imagined ſafe in Oban long before.

I had ſcarcely ſhut my eyes, however, when a loud noiſe awaked me. I heard a rapping and calling at the door; I roſe, and after informing the people of the houſe, who went and opened it, we ſaw our poor friend An-

dreani enter with his attendants, as completely drenched, as if they had been repeatedly plunged under water. They were overtaken by a ſtorm, when half way over, and though ſeveral times driven near to Oban, they were unable to make the harbour. The night was ſo dark, that it was almoſt impoſſible to know where they were, and it was not without encountering the greateſt dangers, and in a manner by mere chance, that they regained the little haven of Achnacregs.

They were numbed with cold; our firſt care, therefore, was to warm them. A large fire was lighted, rum and tea were given them to drink, and every poſſible means were taken to recover them. Count Andreani was himſelf the firſt to laugh at his adventure; but his two ſervants, who had never before travelled beyond the fertile and ſmiling fields of Italy, and who, therefore, felt ſomewhat awkward in their preſent ſituation, were not ſo merrily diſpoſed. They were ſo deeply impreſſed with the dangers and frightful appearance of a ſtormy ſea, amidſt the darkneſs of night, that, returning a thouſand thanks to the Bleſſed Virgin, who had heard their invocation and brought them ſafe to land, they raiſed their hands to heaven, and ſwore, that they

they would never again leave the iſland, barren as it was. "We ſhould prefer," ſaid they, "to crop the herbs in this place, to "expoſing ourſelves, a ſecond time, to the "fury of that abominable ſea." They then muttered their diſpleaſure at their maſter's imprudence and folly, in coming to viſit the moſt deteſtable country in the world. Their pantomimic geſtures, the expreſſion of their countenances, and the ſerious tone of their lamentations, entertained me with a ſcene truly comic.

Repoſe during the remaining part of the night, and the appearance of a fine morning, partly effaced the impreſſions of the preceding evening. The ſea, however, was not yet navigable; and the beſt means of diſſipating tedium was to betake myſelf to active employment.

At ſun-riſe, therefore, I made one of thoſe excurſions from which there is always derived ſome benefit, either for inſtruction or health, and in which I always find my advantage, in whatever country I may travel.

A vaſt black rock, perfectly perpendicular, and almoſt inſulated, forced itſelf upon my attention, ever ſince my arrival at Achna-

cregs. I conjectured that it might be a baſaltic colonade, and I wiſhed to aſcertain the truth of this conjecture. After walking about a mile and a quarter, I arrived at the foot of one of the moſt aſtoniſhing productions of volcanic combuſtion that I ever had an opportunity of obſerving.

It preſented the appearance of an ancient circus, formed of natural walls of baſaltes, riſing perpendicularly with ſo regular a conſtruction, that at firſt view, the ſpectator cannot avoid thinking it to be the production of human induſtry and art. But the utmoſt ſtretch of human force, heightened by all the aid of the mechanic powers, could never have been capable of elevating ſuch enormous maſſes. The whole muſt be regarded as the effect of a vaſt combuſtion, which, inſtead of deſtroying, has here produced appearances analogous to thoſe of a creative power.

This grand natural monument excited a juſt admiration and even enthuſiaſm in my mind. I ſpent two hours in viewing, ſtudying, and obſerving it over again in different points of view, and I was ſtill unwearied of gazing upon it. I went in queſt of my companions, who were tranſported with no leſs admiration than myſelf at the ſight of theſe vaſt baſaltic

baſaltic walls, ſtanding alone, and riſing in a bold and perpendicular fabrick around a circular ſpace, which preſented an arena that would have been well adapted to the games of the ancients.

It is no leſs remarkable, that the acceſſory parts of this ſingular production of ſubterraneous fire ſeem to have been placed in the vicinity, as if with the deſign of furniſhing a key to the problem of its formation.

I meaſured, with the moſt ſcrupulous attention, the height and thickneſs of the walls, and the diameter of the circular encloſure.

On the 6th day, I viſited it once more. In the afternoon of that day, the weather beginning to aſſume a more ſettled appearance, Count Andreani ſaid, that he was reſolved to try his fortune a ſecond time, and that he ſhould ſet off at four o'clock; which he accordingly did. The wind was at this time favourable, and as the ſkiff could not carry us all, we ſuffered him to proceed, promiſing, that we ſhould ſpeedily follow him.

He ſent back the boat, during the night, with a ſupply of eatables, for our cheer had been but very poor and ſcanty for ſome days before, having exhauſted almoſt the whole ſtock of Achnacregs.

This ſupply was extremely uſeful, as the ſtorm returned by the next morning, and the ſea ran too high for us to truſt ourſelves upon it in ſo frail a vehicle. I employed the time in new excurſions, and in arranging my notes, particularly thoſe which related to the mineralogical hiſtory of the iſle of Mull. Theſe I have thrown into a ſeparate ſection, that ſuch of my readers as are intereſted in that ſcience may find the objects which refer to it, united under one head, and that thoſe to whom the ſubject may be indifferent or tireſome, may eaſily paſs it over. It may not be improper to mention a ſecond time, that this is my ordinary mode of proceeding.

At length, on the evening of the 6th of October, which was the eighth of our confinement, a bark having come in to Achnacregs with a cargo of beeves, which was to return on the morrow, we reſolved to embrace the opportunity of a paſſage in her; we accordingly embarked at ſix next morning, not for Oban, but for the iſle of Kerrera, where we landed at eight. We walked along the iſle, which is very ſmall, and at its extremity found a boat, which conveyed us in leſs than one hour to Oban, where our friend Andreani moſt impatientlyexpected our arrival.

CHAP-

CHAPTER VII.

Natural Hiſtory of the Iſland of Mull.

THIS iſland, which is one of the largeſt of the Hebrides, is not more than from twenty to twenty-two miles in length, and fifteen or ſixteen in breadth; but being of a very irregular form, it may be ſtated at eighty miles in circumference at leaſt.

I ſhall proceed to deſcribe the parts which I viſited, in the order of my journey. Thoſe who would wiſh to explore the iſland in the ſame purſuit, by diſembarking at Achnacregs, coming back to Aros, and travelling along the left bank of the ſound of Mull, will trace my itinerary by commencing where I finiſhed it.

AROS.

ROAD FROM AROS TO TORLOISK.

Columns of Baſaltes. Lavas, compact, black, grey, reddiſh, intermixed with Globules of white Zeolite. Blocks of rounded Granite on the Summit of ſome baſaltic Mountains.

THE ancient caſtle of Aros, once the reſidence of the famous M'Donald of the Iſles, now preſents nothing more than a ruin. Its remains ſtand on a ſmall colonade of baſaltes by the brink of the ſea, and on the right ſide of the entrance of the ſmall bay of Aros.

The river of Aros, which might with more propriety be called as a pretty large brook, takes its riſe from a marſhy tract, about the middle of the iſland. From its ſource to its mouth it runs on a compact lava, which varies in colour from a deep black to grey and reddiſh. This lava is in general durable and compact; ſome beds of it, however, are found of a gravelly and friable texture.

Theſe compact lavas contain, in general, ſo great a quantity of knobs of white zeolite, that this laſt matter may be ſaid to form nearly one-third of the weight of the lava.

The zeolite is found here in a globular form, and in general about the bigneſs of a pea.

pea. Some of the globules are radiated; but they are more frequently cryſtalized in a confuſed manner, and without any determinate form. I found nothing of this kind ſufficiently intereſting for the cabinet of the naturaliſt, from Aros to Torloisk. The reaſon was obvious. Every thing was ſo covered with moſs, lichens and heath, that I was forced to confine my reſearches to the bed of the ſmall river, and to ſome gullies connected with it, where the rock was ſomewhat expoſed.

As we drew near to Torloisk, at the diſtance of about three miles from the caſtle, we came to ſome mountains entirely volcanic, and at leaſt two hundred and fifty toiſes high. It excited my aſtoniſhment as I paſſed along their ſummit to obſerve ſome large blocks of granite, rolled and partly rounded, detached from each other, and reſting on the volcanic matter, to which, however, they do not adhere, having been evidently tranſported hither by the effect of ſome convulſion. For adventitious bodies of that kind, and of ſo great bulk, found on mountains and in an iſland where there is no ſolid rock of granite, muſt have been depoſited here by ſome very powerful revolution.

Theſe

Theſe lumps of granite may have been ejected from granitic quarries, which perhaps exiſted at great depths under theſe ancient volcanos, by the exploſions which took place at the epoch when extenſive combuſtions devaſtated theſe countries, and formed groups of iſlands which appear to have the ſame origin.

It is beſides within the verge of poſſibility, that thoſe parts of the mountains where they are now found, were not at that period elevated ſummits, but rather formed part of the bottom of the ſea; and that theſe granitic blocks were rolled from a diſtance by the currents. It is poſſible, that circumſtances of ſubterraneous exploſion, equally terrible with thoſe which formed the iſle of Santorini, in the Archipelago, or Montenove, in Italy, may have raiſed up the bottom of the ſea into volcanic peaks; or, if it ſhould appear more plauſible to ſome, we may refer to a period when mountains ſtill higher were entirely covered with the ſea; a fact, which cannot be doubted, ſince marine bodies are found in great abundance in beds of lime-ſtone or clay, ſituated on the Alps or Apennines, at a height three or four times greater. But the ſubject would require illuſtrations, which the nature of this work does not permit me to enter into.

TOR-

TORLOISK.

Black Baſaltes, with and without Zeolite; altered Lava, which has loſt its Hardneſs and its Colour; Baſaltes calcined on the Surface of a Blood-red Colour, and having the Appearance of a clayey Bole.

At a little diſtance from Mr. M'Lean's houſe, near the road leading to the ſea on the ſide of Kilnynen, is an extent of rugged ſteep rocks bounding the coaſt, which are beat upon by the waves and by frequent rains. They are eaſily obſerved along the whole of that part of the coaſt, being entirely bare.

This craggy tract which extends as far as *Loch-mari*, is compoſed of different currents of baſaltic lava, of a deep black colour. Several of theſe ſtreams are formed of irregular maſſes, others of tables, and ſome have aſſumed a priſmatic form. Here I found ſome pretty large ſpecimens of fine zeolite, ſeveral of which were cryſtallized into cubes, ſome had the appearance of diverging rays, and others were a little calcedonious. They are in general very white, but there are ſome which

which have become fallow from the decompoſition of their iron, and ſeveral alſo have a a light greeniſh tint. They are moſt frequently ſeen in large lumps buried in the lava; but thoſe which have adopted the cubical form, are often found in the fiſſures which ſeparate the different ſtreams of lava.

The traveller ſhould not omit viſiting on the oppoſite quarter, that is, towards the path on his left as he proceeds from Mr. M'Lean's houſe to the ſhore, a quarry, out of which all the ſtones of his buildings have been taken. Here there are found ſeveral lavas which are worthy of attention. They may be obſerved with the ſame facility as the preceding; the interior of the volcanic eminence being completely expoſed to view by digging away the ſtones.

The upper beds of the quarry are formed of a black hard compact lava, containing ſome globules of white zeolite.

Thoſe immediately below, having been probably acted upon by the ſulphurous acid, have loſt a part of their colour and their hardneſs. They are grey, whitiſh, and moſt frequently of the colour of iron ruſt. The zeolite which is found buried in it, has preſerved its

its forms and chymical properties, but has notwithſtanding aſſumed various tints.

Other beds, ſtill lower, have ſuſtained a more conſiderable and different kind of alteration; they are of a bright red, and contain, as well as the lavas over them, ſome globules of zeolite, unaltered with reſpect to their principles, but ſofter and a little coloured. The lava itſelf has loſt its hardneſs.

The lavas of this quarry, though of the ſame texture and compoſition, have undergone different modifications, as well from the exhalations which riſe from this burnt ſoil, as from the action and effects of long continued fire.

The different craters afford a conſtant and remarkable example of the active operation of the vapours, not only on the colours, but alſo on the grain and hardneſs of the lavas which they decompoſe, and form into new combinations of gypſum, iron, allum, ſulphur, &c. I have proofs, likewiſe, that the long continued application of fire, will, in certain circumſtances, transform the hardeſt and blackeſt lavas, baſaltes for example, into a ſtate of red calx, if I may uſe that expreſſion.

Theſe

Theſe ſuperficially calcined lavas in loſing their firſt colour, loſe alſo the elements of their hardneſs; and there are circumſtances in which they become ſoft and ſoapy to the touch like fat clays. I have deſcribed a variety of this kind in my *Mineralogy of Volcanos*, page 395, No. 10.

It is, therefore, of eſſential importance to diſtinguiſh accurately the two kinds of alteration which I have mentioned, and of which the one is owing to the action of acids, and the other to that of long applied heat. Thus the black lavas which compoſe the firſt beds of the volcanic quarry of Torloisk are nowiſe altered. Thoſe which ſucceed them, and which are grey and whitiſh, ſeem to have been diſcoloured and altered by acid vapours; whilſt the deepeſt ſtrata, in which the lava is of a blood-red colour and friable texture, appear to derive that modification ſolely from the long continued action of fire, and a real calcination of the ſurface. In this caſe the fire has not been ſufficiently violent to change the lava into a vitreous ſubſtance; but its prolonged operation has diſunited its parts, and ruſted and oxidified its ferruginous particles, which have changed to a red colour, like that of the calx of lead, which a very violent

violent and long applied heat, converts into the moſt beautiful minium. The globular zeolite which is found in the upper as well lower ſtrata of the quarry of Torloisk, that is, in the black, grey or whitiſh lavas, is the ſame. It is the ſame alſo in the deepeſt beds, where the lava is more altered and has become red. This zeolite differs from that of the other beds only in being a little ſofter; but the difference is not very perceptible.

What has happened here as to the zeolites, has taken place alſo with reſpect to pointed ſchorl in a lava of *Chenavari* in Vivarais. The black ſchorl remains almoſt untouched in the midſt of a lava altered and turned to a red colour by the continued action of a ſtrong fire, but which has not been able to vitrify it *.

I have

* The following is the paſſage of the *Mineralogy of Volcanos*:—"Argillaceous baſaltes of a blood red, with ſpecks "of black ſchorl in the moſt excellent preſervation, "though the lava itſelf is changed completely into an "argillaceous matter ſoft and ſoapy."—*Mineralogy of Volcanos*, page 395, No. 10, in 8vo. Paris, 1784.

I ought to add here, that in ſaying, that the lava had changed into an argillaceous matter, I did not mean that it had paſſed into the ſtate of real clay. My intention was

I have quoted in the ſame work, which I publiſhed in 1784, on the Mineralogy of Volcanos, a daily example of this ſuperficial calcination effected by art. In Vivarais, and alſo on the other bank of the Rhone, lime-kilns are conſtructed with their interior lining of very black and hard baſaltic lava. The pit-coal fewel, with which theſe kilns are continually ſupplied, ſoon vitrifies the whole of the inner ſurface, which then runs into one piece. But as the vitrification does not penetrate above four or five lines in the blocks of lava, which are ſeveral feet thick, the part in immediate contact with it, being expoſed to a leſs degree of heat, paſſes at length into a ſtate of calcination. Its colour becomes red, its hardneſs is deſtroyed, and when the

merely to ſtate that the lava thus altered had put on the exterior appearance of clays; that is, that it was tender, earthy, and ſoft to the touch. I am the more deſirous to explain myſelf upon this ſubject, becauſe ſeveral naturaliſts, who have written upon volcanos, have taken theſe ſubſtances for real clays, regarding them not merely as earthified lavas, but as embodied clays burnt by ſubterraneous fires. In theſe caſes, however, the ſchorls, cryſolites, zeolites, and even pieces of porous lava which are found in it, remove every doubt reſpecting the identity of theſe altered lavas with thoſe which join or cover them, or lie in alternate order with others, and which are perfectly ſound.

kilns

kilns are taken down or repaired, it is eaſy to obſerve through the thickneſs of the lava, the gradual action exerted by a heat ſo violent and long continued. The reader will excuſe this digreſſion, which is by no means foreign to the ſubject.

KNOCK.

MOUNTAIN OF BENMORE, THREE MILES FROM AROS.

Lavas in Slabs, priſms, and irregular Maſſes, hard, ſound, compact; internally of a blackiſh grey, externally of a dull white; decompoſed to the Depth of four or five Lines, and exhibiting the primitive Elements of their Compoſition; in ſome of them are found Globules and Dots of white Zeolite.

In mentioning the mountain of Benmore, I ſaid that it was covered with heath ſo thick as hardly to permit me to diſcover the lava of which it is compoſed. But on paſſing through ſeveral hollows formed by the water which runs down its ſides, I obſerved only one kind of lava, which is grey, hard, compact, and

intermixed with ſeveral globules of zeolite. I carefully examined ſeveral of theſe chaſms from the bottom to the top of the mountain, and no where did I meet with any other kind of lava. But, as the way was very difficult, I was able to viſit the north ſide only of this volcanic peak. I therefore invite thoſe naturaliſts who may follow me in the ſame journey, to attempt the ſouth ſide of the mountain, to diſcover whether the lavas there be equally homogeneous.

Knock is the name of the reſidence of Mr. Campbel; and to diſtinguiſh him from other perſons of the ſame clan, he is deſcribed by the appellation of Campbel of Knock.

His houſe, ſituated on an eminence, at the foot of Benmore, has a view on one ſide of a delightful valley, covered with flocks, and, on the other, of a fine loch or arm of the ſea, navigable, rich in fiſh, and viſited by the herring at the time of their migration.

A conſiderable tract which he has cleared in the midſt of the lavas, to obtain the ſmall quantity of ſoil produced by their decompoſition, muſt have required a labour which nothing but the moſt inflexible conſtancy, ſupported by the hope of fertilizing and embelliſhing

belliſhing the place of his habitation, could have been capable of ſurmounting.

This vaſt undertaking produced conſiderable quantities of volcanic ſtones, broken, ſplit, and cut in various directions; from which the ground is cleared by forming them into dry walls of great extent and proportionate thickneſs. Theſe encloſures, which are very numerous, preſent to the naturaliſt a moſt agreeable field of obſervation. The lavas are compact, and of a black or rather deep grey colour approaching black. They are frequently diſpoſed in tables, ſometimes in priſms, and at other times in irregular maſſes. Their fracture preſents a paſte of a homogeneous appearance, of a grain compact, ſmooth and ſuſceptible, of a fine poliſh. But a peculiar alteration obſervable on its ſurface, and which has penetrated a few lines into its interior, merits all the attention of the naturaliſt, and renders this kind of lavas very intereſting.

This alteration, operated by time, or rather by the different modifications of the air upon the lavas, has diſcovered their conſtituent principles. It may be regarded as a ſort of natural diſſection, which, by deſtroying cer-

tain parts, has expoſed to view thoſe which would otherwiſe remain concealed, and which no chymical analyſis could have ever brought to light. This requires a more particular explanation; which I proceed to give, with a ſpecimen in my hand, that thoſe who may have occaſion to obſerve ſimilar lavas, which are very common in the ancient extinct volcanos of France, may be better able to correct my errors, if they ſhall be of opinion that I have committed any, or make uſe with me of a means which may ſometimes diſcover to what ſtone a particular lava belonged before its fuſion.

The lavas in queſtion I repeat, appear on being broken, of a hard compact texture, and of a dark grey colour, approaching to black. The particles ſeem well amalgamated and homogeneous; nor does the microſcope even diſcover any difference between them.

If we proceed to the examination of their exterior parts, we find their ſurface grained, unequal, and rugged to the touch, and exhibiting cryſtals and plates of felt ſpar, jutting points of black ſchorl, fixed often in the felt ſpar itſelf, and both the one and the other ſurrounded with ſmall cavities, by which they

they are completely inſulated, and which prove that the particles, amidſt which the felt ſpar and ſchorl were incloſed, have been deſtroyed.

The white cryſtals of felt ſpar are ſlightly touched with a reddiſh tint; which is a little deeper in the interſtices where it has been more difficult for the rain-water to inſinuate itſelf, and to waſh away the ochreous particles produced by the decompoſition of iron.

The naturaliſt, moſt experienced in lithology, on ſeeing their decompoſed ſurface, cannot avoid regarding them, at firſt view, as real granites. He does not find himſelf embarraſſed, until he examines their fracture and their interior texture, and eſpecially until he preſents to the magnet the unaltered part which attracts it as ſtrongly as baſaltic lava of the richeſt iron ore; whilſt the exterior cruſt has no impreſſion upon it.

It thence reſults, that the iron which forms one of the conſtituent principles of this lava, has ſuſtained a complete change of its natural properties, in which it has been accompanied with the earthy particles which were combined or united with it.

This connexion being deſtroyed, the ſubſtances which eſcaped decompoſition, ſuch as felt ſpar, ſchorl, and ſeveral ſmall pieces of quartz have been exhibited to view; ſo that on removing the covering under which they are concealed, it is not very difficult to diſcover their organization.

Their original ſtate appears, therefore, to have been that of a granitic or porphyric rock. The naturaliſt will more ready decide in favour of the latter, from the conſideration that the baſis of real porphyric is in general petroſilex, which, whatever be its hardneſs or its colour, is ſometimes found decompoſed naturally in the open air, and is alſo capable of being acted upon by ſulphurous acid vapours.

But to be aſſured that this lava owes its exiſtence to a porphyric ſubſtance, with a baſis of petroſilex, nothing elſe is required than to fuſe with the blow-pipe a ſmall fragment of the ſoundeſt part, that is, the part which has preſerved its hardneſs and its black colour, and the reſult will ſoon appear to be a white enamel, which is a characteriſtic mark of petroſilices; whereas the lava with a horn-ſtone baſis produces a fine enamel of a deep

deep black colour. My learned friend, Deodat Dolomieu, has ſufficiently eſtabliſhed that diſtinction in his excellent memoirs.

Similar lavas are found at the foot of Mount Mezinc, in the Vivarais, near Pui, in Velai, on the Euganean mountains, and in the iſles of Ponces.

It always preſents itſelf as a ſubject of aſtoniſhment, on examining certain lavas, that ſubterraneous fires ſhould have melted into a ſtream, ſtones which now appear of the hardeſt conſiſtence, and that with ſcarcely any change in their primitive organization.

LEDIRKILL.

ROAD FROM AROS TO ACHNACREGS.

White compact Lavas which have preſerved their hardneſs.

On the road to Ledirkill, I obſerved ſome hard compact and very white lavas. They do not appear to have undergone any alteration, either ſpontaneouſly, or by means of emanations of gas. Their texture is pretty homogeneous; but the particles are a little ſcaly,

ſcaly, and bear a reſemblance to thoſe of a certain felt ſpar.

Their white colour does not ſeem to announce the preſence of iron. But one would be led into an error by truſting to their firſt appearance; for they have a very ſenſible action on the loadſtone. There are ſome white mines of very rich ſpathoſe iron, of which the colour does not exhibit the leaſt indication.

The white lavas of Ledirkill have ſome reſemblance to ſtones of tolfa with this difference, that the latter are nowiſe magnetic, and that the former produce no allum.

I am therefore induced to conſider the lavas of Ledirkill, as naturally white, and as deriving their exiſtence from ſtones of the ſame nature as thoſe with a petroſiliceous baſe, or a baſe of felt ſpar in one maſs *.

ACHNA-

* Deodat Dolomieu, who has ſo well obſerved the different cauſes which tend to decompoſe or diſcolour lavas, thinks with me, that there are ſome of them naturally white. "There are a number of lavas," ſays this learned mineralogiſt, "of a white or whitiſh colour, which have "never been attacked by vapours, and which have not "ſuſtained the leaſt alteration. This is proved by local "circumſtances, by the hardneſs, and the perfect preſer- "vation of the felt ſpar and the micas which they contain. "I could inſtance a vaſt number of lavas which are na-

"tually

ACHNACREGS.

Beds of Lime-ſtone, between two Banks of Free-ſtone, in the midſt of the Lavas, and with Belemnites in the Lime-ſtone.

About half a mile from Achnacregs, and at no great diſtance from the proſtrate column which I have mentioned, and which the inhabitants regard as the work of Oſſian, there is by the ſea-ſide a craggy ridge, upon which the waves beat with ſo much fury, that they have torn the volcanic rock in ſeveral directions.

By inceſſantly attacking this natural mound, for ſo many ages, the waves have brought to view a bed of lime-ſtone, that formerly lay buried under a current of black baſaltic lava, of which the whole coaſt is formed. This bed, which is at a medium, about fifteen feet broad, is completely uncovered for a ſpace of at leaſt twenty toiſes in length at low water; and loſes itſelf in the maſs of lavas which riſe into hills as they recede from the coaſt.

" turally white; ſuch are thoſe of the Euganean moun-
" tains near Padua, named *granitello*, ſeveral lavas of Ætna,
" Germany, &c." Memoirs on the iſlands of Ponces, by Deodat Dolomieu, Paris, Archet, 1788, in 8vo. p. 37.

The

The lime-ſtone is grey, hard, and brittle. It is not very pure, being mixed with a ſmall quantity of argillaceous earth; it is good, however, for making lime. I found ſome belemnites in it, the largeſt of which were five inches in length, and an inch and a half in circumference towards the baſe.

This calcareous ſtratum does not adhere directly to the baſaltic lava. There is an intermedium of two pretty thick beds of quartzoſe free-ſtone with large grains, united by a cement partly calcareous. It is to theſe that the lava adheres; and had not the free-ſtone been uncovered by the daily and violent action of the ſea, it would never have been imagined that there exiſted under theſe enormous maſſes of baſaltic lava, a layer of calcareous matter, incloſed itſelf between two beds of free-ſtone *.

* In the 160th and following pages of my Mineralogy of Volcanos, I have mentioned ſome analogous, but much more remarkable appearances, which I obſerved in the mountains of Chamarelle in Vivarais, near Villeneuve de Bery, where there are beds of lime-ſtone and baſaltic lavas placed in alternate ſucceſſion, and where belemnites are found in the lime-ſtone, as in that of Achnacregs In that work I have ſtated my conjectures reſpecting the manner in which theſe different beds might have been formed at the remote period when every part of the ocean was agitated by volcanos.

Grand natural baſaltic Wall reſembling an ancient Circus.

To the north of Achnacregs, on the right ſide of the road from the houſe, and about ſix hundred toiſes diſtant from it, we obſerved, cloſe by the ſea, a natural platform of a ſemi-circular ſhape, ſituated on an eminence which riſes about a hundred and fifty feet above the level of the water, and which is entirely compoſed of black lavas of a baſaltic nature. This ſmall plain, which has a gentle ſlope, is bounded on the ſouth by a perpendicular volcanic cliff.

A vaſt detached wall lines a portion of the circle, formed by a baſaltic rock which riſes in the oppoſite quarter, and there thence reſults a kind of antique circus that fills one with aſtoniſhment at the firſt glance, and gives this ſingular place the appearance of a ruin as extraordinary as pictureſque.

The objects aſſume a new character of grandeur in proportion as they are approached; and the picture becomes more ſtriking when the height of the wall and its aſtoniſhing regularity are viewed from a near ſituation.

At

At firſt, one is loſt in conſidering how, or from what motive, human beings ſhould have raiſed, in a place ſo remote and deſert, a monument preſenting the image of a Roman circus.

The farther the obſerver advances, the more ſurpriſing does this kind of arena become. A large angular breach in the midſt of the wall permits the eye to diſcover the interior of this antique ruin. On approaching the opening he feels a lively curioſity intermixed with uncertainty, reſpecting the nature of the object preſented to his view. Such at leaſt were the ſenſations that my companions and myſelf experienced the firſt time that we went to ſee this remarkable place, which we conceived, even when quite cloſe to it, to be a monument of art.

There is nothing here, however, but the work of nature, and one of the moſt extraordinary productions of ſubterraneous combuſtion; no leſs aſtoniſhing, perhaps, in its kind, than that which gave exiſtence to the cave of Fingal.

I have mentioned, that a rock of black baſaltes, cut perpendicularly down, and deſcribing a natural ſegment of a circle, forms the

the bottom of the circus. A vaſt wall, perfectly upright, forms the remainder of the incloſure.

This wonderful wall engroſſed all our attention. It is eighty-nine feet long, perfectly ſtraight, and compoſed entirely of priſms of black baſaltes, of equal length, and placed horizontally above each other; that is, all theſe priſms, which are in good preſervation, and pretty equal, laid one upon another, form the thickneſs of this wall which is detached on both ſides. Its facings are pretty even, and it ſtands erect without any buttreſs, though it exceeds twenty-five feet in height. It is connected, at its northern entremity only, with a projecting part of the volcanic rock which forms the circular bottom of the amphitheatre.

The breach in the middle of the wall is fourteen feet four inches wide at bottom, that is, even with the ground, and forty feet at the top. It forms a large obtuſe angle, and give a very pictureſque appearance of a ruin to the whole of the circus. This opening is probably the effect of an earthquake. I counted about forty priſms within the wall which ſeemed to have belonged to it, and about

about thirty-nine without. But theſe are nothing to what would be ſtill neceſſary to fill it up; and it is not very probable that any perſon carried them away. The ſea is at preſent a hundred feet diſtant from the wall, and forty feet lower than it. It is poſſible, however, that the waves may have beat out the part at ſome very remote period, and carried off the greater portion of the materials which are wanting. This conjecture, will perhaps, appear more probable than the firſt, when I ſhall have deſcribed other objects in the vicinity of the wall, which are well fitted to throw ſome light on the theory of its formation. I ſhall ſhortly return to this ſubject.

Nothing is better calculated to convey an idea of this baſaltic wall than the manner in which the wood for firing is arranged in the wood-yards of Paris. It is well known that theſe pieces are all of the ſame length, and that they are piled up horizontally above each other. I do not mean thoſe enormous piles which over top the houſes, and form vaſt maſſes of wood; becauſe, in that caſe, the pieces are placed longitudinally and croſſwiſe alternately, but I mean thoſe kinds of walls: the thickneſs of which conſiſt of the length of a

ſingle

ſingle piece, and which are carried only to the height of ten or twelve feet, that the wood may be more at hand for daily ſale.

I am obliged to uſe this trivial compariſon, in order to make myſelf better underſtood. It is not eaſy to be perſpicuous, and at the ſame time to avoid fatiguing the reader with details too minute or imperfectly expreſſed, when it is neceſſary to deſcribe objects which Nature ſeems to have produced in her capricious moments, to embarraſs us with aberrations of which ſhe exhibits a few examples only.

I am fully conſcious of my inability to expreſs all that I ſaw, or all that I felt, on ſeeing the volcanic circus in the vicinity of Achnacregs. I therefore entreat the moſt ample indulgence with reſpect to what I have already ſaid, and what I have yet to obſerve.

The height of the great wall is twenty-five feet ten inches, its thickneſs ſeven feet ten inches, and the priſms, of which it is compoſed, are conſequently of the ſame length.

The priſms are pentagonal, hexagonal and ſeven ſided. A very few are quadrangular; but the moſt common are the pentagonal and hexagonal. They are black, hard, ſound in their fracture, and magnetic.

The firſt eight courſes of the upper part of the wall are formed of priſms of the ſame ſhape and ſize, in excellent preſervation, and placed horizontally one above another without any adheſion; that is, they might be eaſily raiſed one after another. But they lie ſo cloſe upon each other that there is no vacancy between them except merely the lines of ſeparation which define the priſms, and give the facings of this ſingular wall a reſemblance to moſaic work.

The priſms which ſucceed the firſt eight courſes are likewiſe of the ſame mould; but they are cut tranſverſely in ſome parts, either from the natural effect of contraction at the time of the lava's cooling, or from the weight of the incumbent maſs at a period long ſubſequent to their formation.

The wall commences towards the weſt, where it ſupports itſelf againſt a rock of lava. It then takes a ſouth-eaſt direction, and turning, ſtretches along to the north-north-weſt, and afterward to the ſouth-ſouth-eaſt. It is not of an equal height throughout. The higheſt part, which is alſo the beſt preſerved, is twenty-five feet ten inches, as I have ſtated already; the other parts are about twenty-

one

one feet ſeven inches high. It is detached on both ſides, and is, in all, eighty-nine feet in length, including the breach. The greateſt diameter of the circus, which is rather of an oval than circular form, is ſixty-ſix feet eight inches; and to bring all the meaſurements into one view, I may repeat, that the wall is a hundred feet diſtant from the ſea, and ſtands on a ground entirely covered with lava, and raiſed forty feet above the level of the ſea in ordinary tides.

It is doubtleſs very difficult to conceive how the lava, when flowing, could have formed a wall ſo high, of ſuch regular conſtruction, unconnected with any other maſs, and compoſed entirely of differently ſided priſms, placed horizontally by the ſide of each other, with ſuch order and perfect ſymmetry, that the art of the moſt able ſtone-cutter could never have arranged them with equal dexterity.

This problem, however, which is certainly attended with great difficulties, finds, on the ſpot itſelf, ſome means of ſolution, ariſing from particular circumſtances capable of conveying ſome idea of the manner in which this priſmatic wall was formed.

For this purpoſe, it is neceſſary only to ſtep about forty paces towards the ſouth-ſouth-eaſt part of the circus, which is cloſe by the ſea. There two facts may be diſcovered, which ſerve to explain this remarkable theory.

I am happy that I continued ſo long on the ſpot, and that I ſo carefully traced all the windings of this ſingular volcanic monument; for, otherwiſe, this important obſervation might have eſcaped me.

Two extenſive excavations naturally formed in the lava itſelf, one of which is twenty-two feet deep, ſixteen feet broad, and a hundred and forty-ſix feet long, and the other eighty-five long, nineteen broad, and twenty-one deep, at a medium, ſeem as if they had been deſignedly placed there, at no great diſtance from each other, to invite the obſerver to repair thither in order to learn the manner in which nature operates in the conſtruction of ſuch walls.

Let the reader imagine to himſelf, for a moment, two ſtreams of lava of a conſiderable thickneſs, which at the time of ſome great eruption, have flowed parallel to each other, with an interval of ſeveral toiſes between

between them: The caſe is not without a precedent, at Ætna, the volcano of the iſle of Bourbon, and elſewhere. From theſe two ſtreams reſult a long and deep gallery, or a kind of covert-way, more or leſs ſtraight, more or leſs circular or winding, according to local circumſtances, and the obſtacles which might have occurred in their progreſs.

But admitting that two currents of lava might, by approaching each other, form a gallery, ſtill it may be aſked, how is it poſſible that they ſhould aſſume a direction ſo equal and ſo parallel as to produce a channel nearly uniform throughout, and of which the interior ſurface is perfectly even? I might reply, that the caſe may have exiſted, ſince we have ſeveral inſtances of it, and I would add, that naturaliſts know very well, that in great eruptions, the lava does not flow along with the ſame fluidity as melted metals, but in the ſtate of a thick paſte, which the air, by cooling the parts expoſed to its influence, conſolidates in an erect poſition. This is a fact which may be witneſſed in a number of inſtances, in which the boiling lava proceeds along ſlowly, but at the ſame time to a great diſtance, in a ſtream with per-

pendicular ſides. What is ſtill more ſurpriſing is, that theſe currents are ſometimes ſeen to divide into two parts, like two branches of a river, on merely meeting with a body which one might ſuppoſe they could eaſily overturn, ſuch as a ſtone mound, or even a houſe. Sir William Hamilton has accurately obſerved, and deſcribed this aſtoniſhing phenomenon in his excellent deſcription of the eruption of Veſuvius.

Other cauſes may contribute to give regularity and ſmoothneſs to the interior facings of a gallery formed by two parallel currents of lava.

The volcano, for inſtance, may have been ſubmarine, or only in the vicinity of the ſea, where thoſe at preſent in activity are almoſt all ſituated. We have, then, only to ſuppoſe two currents of lava, flowing at a ſmall diſtance from each towards the water, and extending under it to a certain diſtance. The ſudden cooling, the reſiſtance of the fluid, the thick and deep ſlime which generally covers its bottom, a bank of ſhifting ſand, or other unknown cauſes, may give riſe to what ſo much aſtoniſhes us, namely, the parallelism and equality of the interior ſurface.

It

It is of little importance to know the exact and perfect theory of these works of nature. It is sufficient that the fact exists, and that it cannot be doubted, after examining the two large and deep galleries mentioned above, which appear in open view at no great distance from the circus, and which enable us to explain the formation of the great wall. I have only to entreat the readers' patience and indulgence for the details, already too long and tedious, which I am obliged to enter into in order to make myself intelligible upon a subject, dry and difficult in itself, but calculated to entertain with curious facts such as are attached to these kind of studies and observations.

The first of the two galleries was such as strongly to excite our attention at first sight. I have already said that it is eighty-five feet long, nineteen broad, and twenty-one feet of average depth. It is wholly uncovered. There is no access to it, however, except at one place, where, with a little address, and by the aid of some blocks of lava which have fallen in and form a kind of steps, one may descend to the bottom.

This long and profound excavation is the effect ſimply of two currents proceeding in the ſame direction, with an interval of fifteen feet between them. The lava of which they are compoſed is black, and of the kind which I have denominated in the *Mineralogy of Volcanos*, gravelly lava; that is, which has little adheſion and falls naturally into gravelly ſplinters, in the form of knobs of a greater or ſmaller bulk having a general tendency to ſeparate in that manner, particularly in the parts expoſed to the air and to the alternate effects of dryneſs and humidity.

Matters being in this ſtate, and the channel or gallery being formed, it then ſerved as a mould to a current of baſaltic lava, compact, homogeneous, and of great ſolidity, which ſubſequently flowed into it, and thus created a wall ſomething ſimilar to the caſed walls of the Romans.

As the current of baſaltic lava would pour along the channel in a boiling ſtate, its ſides, that is, the parts in contact with the faces of the gallery muſt have neceſſarily been the firſt cooled. The caloric thus eſcaping by the ſides, the lava would ſhrink into a ſmaller bulk and muſt thence have unavoidably cracked into

into pieces of a prismatic form. The loss of heat, and the *gaseous* emanations forcing the matter to contract itself, the result must have been that this sort of cast wall should split into horizontal prisms of several sides, placed naturally one above another.

The outer walls, which served as moulds, and which are composed of a gravelly earth, need only have been attacked and destroyed by the water, either gradually during a lapse of time, or by some extraordinary agitation of the sea; and the middle wall, which consisted of the most solid materials, being thus stripped of its mould, would appear to have been erected in a miraculous manner, and to have arisen out of the earth as an amphitheatrical decoration.

This is precisely what happened in the present case, at least to such a degree as to admit of no doubt respecting the fact: For, in the middle of the gallery I have mentioned, there appears a perpendicular wall, three and a half feet thick, and eight high, completely divested of lava, detached on both sides, and entirely composed of prismatic columns laid horizontally above each other, but preserving a certain mutual adhesion, which has prevented

vented them from falling, and enabled them to reſiſt the action of time and the elements, which they could not otherwiſe have withſtood.

I thought I ſhould never weary of admiring this wall. I could walk round it with eaſe; the whole breadth of the gallery being only nineteen feet, of which the priſmatic wall occupied only four and a half; ſo that it ſtands nearly in the midſt of a vacant ſpace of fourteen feet ſix inches, having ſeven feet three inches on each ſide.

This vacancy was probably once filled up with the ſame gravelly lava of which the ſides of the gallery conſiſt. The ſea, which ruſhes into the gallery with violence during tempeſtuous weather and ſpring tides, by an aperture which communicates with it, muſt have carried off the gravellous lava wanting, and and in the center of which the wall was incloſed.

It is probable that from the continued action of time, rain, hoar-froſt, and the ſea, on the gravelly lava of the gallery, the wall will one day be entirely ſtripped of any incloſure on either ſide, and that no veſtige will remain of the primitive mould to which it owes its formation.

I have

I have now only to mention its preſent height, which is no more than eight feet, whilſt that of the cavity in which it is placed is twenty-one feet.

I reflected upon this fact on the ſpot, and I think I ſhall be able to account for it by ſaying, that it is probable that the wall was once higher, but that the upper courſes having been formed of priſms which did not adhere to each other, the ſea muſt have undermined and carried them away.

This opinion gains ſome ſtrength, from an examination of the ſecond gallery, which is at a ſmall diſtance from the firſt, and on which I ſhall dwell for a moment only.

This gallery, which is much larger than the other, is a hundred and forty-ſix feet long, twenty-two feet deep, and ſixteen feet broad. It may be regarded, in one ſenſe, at leaſt, as the reverſe of the former. The two parallel currents, which have ſerved to form it, conſiſt of black, compact, very hard lava, in a ſolid maſs, which has reſiſted all the injuries of the weather, the action of the air, and the higheſt tides.

A ſtream of compact, homogeneous, lava, occupied alſo the whole length of this vaſt gallery.

gallery. But the baſaltic lava of this ſecondary current conſiſted of a paſte ſo ſmooth and ſo well amalgamated, and which had ſo great a tendency to divide into regular and perfect, that they lay horizontally upon each other withou any connection or adheſion between them, as far as I could judge from a ſmall part of it remaining towards the beginning of the gallery, which the ſea had not yet reached.

The priſms of this remnant are truly aſtoniſhing from their excellent ſtate of preſervation and the complete regularity of their form. They ſeem as if they had been placed there with all the care and art of human hands: ſo very wonderful is the ſymmetry and perfection of their arrangement. There is not one of theſe priſms, picked up at random, which would not figure in a cabinet of natural hiſtory.

Their want of adheſion has been the cauſe of their gradual demolition; for the waves meeting the moſt obſtinate reſiſtance from the ſides of the gallery, which are of unſhaken ſolidity, directed all their fury againſt the priſms, which they eaſily undermined and dragged into the depth of the ocean. Thus has the priſmatic

wall

wall been entirely deſtroyed, whilſt the mould, which contribute to form it remains unimpaired.

Such is the manner in which volcanos, ſo frequently the agents of deſtruction, are able to create, or rather to imitate, by a ſucceſſion of accidental circumſtances, productions which cannot be effected by mankind without much labour and a train of tedious and difficult means and combinations *.

From

* I made theſe obſervations on the ſpot in the month of October, 1784. Deodat Dolomieu, three years afterwards, that is, in the month of July, 1787, on viſiting the iſles of Ponces diſcovered a ſimilar wall, but conſiſting of much ſmaller priſms. As the compariſon may be intereſting to Naturaliſts, I ſhall make uſe of the language of my friend: "The ſmall baſaltes are very numerous in the iſles of Ponces. They are found in a multitude of places, but principally in the rocks of Chiardiluna, to the left of the ſubterraneous gallery. There are thouſands of them on both ſides of the ſmall bay of St. Mary, eſpecially on the mountain in the rear of the houſes. Theſe ſmall priſmatic columns naturally ſplit aſunder and fall into the ſea. Some of them are of the moſt perfect regularity, and exhibit all the variety of forms of which they are ſuſceptible. They are ſeen in heaps of different forms, but more frequently piled horizontally on each other, and riſing above the ground in the form of walls which perfectly reſemble thoſe in the ancient fabricks called *opera reticulata*. Several rows or walls made of priſms nearly a foot long, riſe one behind another."

Dolomieu

From the preceding obſervations it would appear that the grand wall which forms the volcanic circus of Achnacregs, can have no other than the ſame origin. But as the flat tract on which it ſtands is forty feet above the preſent level of the ſea, and the wall itſelf is ſtill twenty-five feet ten inches high, it muſt follow that the ſea has fallen ſixty-five feet ten inches in that quarter, unleſs we ſuppoſe that the coaſt has been elevated by the incalculable efforts of ſome vaſt ſubterraneous exploſion.

Mr. Anderſon, who travelled by command of the Engliſh government, with a view to the fiſheries, through ſeveral of the Hebrides, at the time I viſited them, told me, that he ſaw in the iſle of Iſlay, a volcanic wall of the ſame kind with that of Achnacregs, reſpecting which I had given him ſome details. He further informed me, that the wall commences to the weſt of the iſland in a place called *Cove*; that it deſcribes a diagonal line of three hundred paces long; that it is at leaſt fifty feet

Dolomieu entertains the ſame opinion with me reſpecting the theory of theſe walls; he regards them as having been formed by incloſure in the interſtices of the lava.

Memoire ſur les iſles Ponces, by Deodat Dolomieu. Paris 1788, in 8vo. 98 and following pages.

high

high and four feet thick; that about one-half of it ſtands out of the water, and the other projects into the ſea, where it forms a jutty ſo extraordinary and ſo much reſembling the work of art, that, at the firſt view, it would appear to be the production of human labour.

CHAP.

CHAPTER VIII.

The Iſle of Kerrera.

THE iſles of Mull and Kerrera are ſeparated by a narrow channel which may be croſſed from Achnacregs in leſs than four hours. Kerrera almoſt touches the main land, by a point which runs out towards Oban; for the ſtrait on that ſide is in ſome places not above fifty toiſes broad. I croſſed the iſle of Kerrera diagonally in order to get to a ſmall ferry-boat, which was at one of its extremities.

A part of the iſland is volcanic. On the coaſt fronting Mull there are collections of compact lavas diſpoſed in maſſes and in large currents. This baſaltic lava appears ſometimes in the form of priſms, which are not very regular, at leaſt in the places which I had an opportunity of examining. I alſo found ſome rocks of micaceous ſchiſtus of a whitiſh colour, and others which were greeniſh

greeniſh with a fibrous texture. Theſe ſchiſtus or *kneiſs* are compoſed of quartz, ſteatites and ſmall ſcales of mica.

Near the rocks of micaceous ſchiſtus there is found common ſlate of a deep grey colour, approaching to black, the beds of which are almoſt even with the ground: quarries might be eaſily opened here with great advantage to the country. They would even become an object of commerce. Among the ſlate there are found ſome brilliant pyrites, the cryſtalizations of which are cubical.

Such were the objects which engroſſed my attention in the iſle of Kerrera, where I obſerved a good deal of paſture ground, and ſome cultivated parts bearing barley and oats. The cottages were ſcattered to the right and left, but they were few in number.

I was only four hours in croſſing the whole length of the iſland. I found at its extremity the ferry-boat which I mentioned above. It was a ſmall ſkiff managed by a ſingle man. I was fatigued. I made the boatman proceed directly to Oban, where I landed in leſs than an hour, and I

found Count Andreani with our carriages, and every thing ready for our departure on the next day. In the evening, we made every neceſſary preparation for commencing our journey by day-break.

CHAP-

CHAPTER IX.

Departure from Oban.—Dalmally.—Tindrum.—Lead Ore.—Killin.—River Muſcle containing Pearls.—Deſcription of theſe Pearls and their origin.

WE left Oban on the 7th of October, at ſix in the morning, to proceed to Dalmally. The diſtance is about twenty-four miles, along a ſtony road, paſſing through ravines. We arrived at the place of our deſtination about ſeven in the evening.

Bunhave, of which I have already ſpoken, is about midway; it is a ſmall hamlet, built at the union of a branch of Loch Awe, with Loch Etive, which has ſufficient water for ſmall veſſels, and where ſalmon abounds.

We viſited an iron foundery, at a ſmall diſtance from Bunhave. It ſtands in a charming ſituation, embelliſhed around with woods, verdant banks, and cultivated fields. A beautiful avenue led to the Loch, which was at this time covered with veſſels, that

rendered the ſcene ſo much the more enchanting. This delightful ſpot formed a ſtrong contraſt with the barren mountains of reddiſh porphyry, and the piles of rocky fragments with which it is ſurrounded.

We were agreeably ſurpriſed to find an eſtabliſhment of this kind in ſo diſtant a part of Scotland, where cultivation and the arts have made ſo little progreſs; we were informed that it belonged to an Engliſh company who had been induced to erect works in this place in conſequence of the abundance of wood and water and its proximity to the ſea.

We waited upon the manager of the works, who received us very politely, and ſhewed us ſome iron of a very fine quality, the reſult of his labours. I expreſſed my aſtoniſhment that this iron ſhould be made in a place where there was no indication of ore, and obſerved to him, that I had not ſeen the ſmalleſt veſtige of any all the way from Oban. He replied, that my ſurpriſe was very natural, for that the ore uſed in this foundery was brought in veſſels from Cumberland; he then ſhewed me ſome collections of red hematites, partly decompoſed, of an excellent quality and rich in iron.

This

This eſtabliſhment appeared to be conducted with equal ſkill and economy ; but the wood was beginning to become ſcarce, as the neighbouring foreſts were not ſufficiently extenſive to yield conſtant and regular ſupplies. It is therefore to be feared that this foundery cannot be carried on much longer.

On arriving at Dalmally I had the pleaſure of ſeeing our good friend, Patrick Fraſer, who ſupped and paſſed the evening with us. He informed me of new reſearches he had made with reſpect to the poetry of Oſſian, ſome fragments of which he had recovered, in the different excurſions he made for that purpoſe among the inhabitants of the mountains, and little frequented places of this part of Scotland. He had alſo enriched his collection with other poems made by the more modern bards of the country. This worthy man, of a mild, modeſt character, and paſſionately fond of literature, was unfortunately placed like an exile in the midſt of theſe barren and melancholy mountains, where, to preſerve his exiſtence, he was obliged to perform the functions of a ſchoolmaſter. I earneſtly wiſh that his condition may be ameliorated. The Antiquarian Society, eſtabliſhed at Edinburgh,

would do well to employ the knowledge and activity of Patrick Fraſer in reſearches reſpecting the ancient ſtate of ſcience and literature in Scotland. He has the advantage of being perfectly maſter of the original language of his country, which has not the ſmalleſt relation to the Engliſh.

Patrick Fraſer begged that I would ſend him ſome French books which he wanted; and, on my return to Paris, I ſhall haſten to pay to him this ſmall teſtimony of my eſteem for his talents, and reſpect for his moral qualities *. "I can only," ſaid he, "in return, "give you my addreſs, and offer you my poor "ſervices in this country." I here with pleaſure tranſcribe this addreſs in Engliſh, that thoſe who may feel an intereſt in knowing this affable and amiable man may not be ignorant of the place of his reſidence. It was exactly as follows: "*Patrick Fraſer*, "*Schoolmaſter, of Glenorchy, by Inveraray*, "*Scotland.*"

* I have ſent him ſuch books as I thought would be agreeable to him; but the diſtance and the difficulty of communication to this diſtant part of Scotland, have, doubtleſs, prevented me from hearing from him; it is even poſſible that he has neither received my letter, nor my packet.

We

We ſlept at Dalmally, and proceeded next morning to Tindrum; the journey was only twelve miles, but we wiſhed to arrive in time that we might have an opportunity of examining the lead ore which we were informed was to be ſeen in the neighbourhood of that place.

The valley of Glenlochy, through which we paſſed, is in ſome places very agreeable. It is ſkirted with hills which are covered with flocks of ſheep; but we found that the mountains cloſed as we advanced, and the ſoil became marſhy and ſterile. The turf with which it was covered, gave a very diſmal hue to the face of the country, which excited in our minds a ſenſation of correſponding melancholy.

The hamlet of Tindrum conſiſts of only a few houſes which are almoſt all detached; it ſtands upon a low marſhy piece of ground: a humid and unwholeſome vapour renders its ſituation very diſagreeable.

The place where the lead ore is found is not far diſtant from the iron, but it is very elevated. It is neceſſary to form the galleries in a very high mountain of difficult acceſs. They are cut through a grey micaceous ſchiſtus rock, which is intermixed with a

conſiderable quantity of white quartz: the vein of lead ore is found in a matrix of the latter ſubſtance. The ore is uſually accompanied by pyrites or horn-ſtone, and it is ſufficiently abundant. It is ſometimes covered with fine cryſtals of calcareous ſpar. The galleries in general are in a very bad condition, and the works are very negligently managed.

When the pieces of ore are extracted they are broken with hammers, they are then waſhed to ſeparate the ore from foreign ſubſtances, which, when thus prepared, is tranſported to a foundery ſituated in the valley at the bottom of the mountain: charcoal and turf are uſed in ſmelting it; but I do not know in what proportion, becauſe the foundery was not worked at this time, on account of ſome reparations which were then making in the furnace. Beſides, the Engliſh, as well as the Dutch, are very reſerved in explaining their proceſſes, even in the moſt ſimple arts, which they always exerciſe with a kind of myſtery: It is not ſo in France; there the managers of the moſt intereſting eſtabliſhments, are in general very complaiſant, and frankly communicate to a ſtranger all the information he can deſire.

I obſerved

I obſerved under vaſt ſheds conſiderable piles of peats, and near them a heap of pit-coal. From this, I preſumed, that in uſing the peats, a mixture of a fourth or fifth part of coal is added. The latter article muſt be carefully huſbanded, on account of the diſtance of the pits, and the dearneſs of land-carriage.

It would be deſireable for the benefit of our manufactories in which wood begins to be ſcarce, that a ſimilar mixture of peat and coal ſhould be employed, where they can be procured. As I ſhould have been happy to ſupport my recommendation with an example, I begged of one of the ſuperintendants of the works to inform me in what proportions the peat and coal were uſed; but he turned a deaf ear to my requeſt, and changed the converſation to ſome other topic.

It is very eaſy, however, to make experiments upon the ſubject, and there is no doubt of their being attended with ſucceſs; particularly if conducted by perſons well acquainted with the quality of the peat and turf which are to be uſed.

It appears that the lead-mines of Tindrum have formerly been much more productive and valuable.

I left

I left this place and proceeded to Killin, by a road as diſmal as uniform in its appearance. I much doubt whether another ſuch can be found. It is made upon a bottom of ſpungy turf, which permits the water to filtrate eaſily through its elaſtic and moving ſubſtance, without however becoming marſhy, for carriages paſs over it without any inconvenience.

But what renders it moſt inſupportably tireſome is, that it extends in this ſtate for ſeveral leagues, between two cloſe mountains, covered with a black turf, on which there grow nothing but ſhort heath and ſome yellowiſh moſſes, that diſtil the water, drop by drop, on all ſides.

The mind ſoon participates in the gloomy hue, and is more and more overcaſt with ſadneſs, as the traveller advances; but on reaching the extremity of this kind of ſombre gallery, the ſcene is ſuddenly changed, the horizon expands, and the fine valley of *Glen* Dochart, ſucceeded by that of Strafilan, open to his view.

Here limpid and copious ſtreams, teeming with fiſh, glide in ſerpentine meanders, through the ſmiling verdure, and form iſlets

ſhaded

ſhaded with wide ſpreading trees. On every ſide appear neat ruſtic habitations, with numerous flocks of black cattle and ſheep, and the young ſhepherds and ſhepherdeſſes who tend them make the air reſound with their ſongs, and animate the delightful ſcene with their dances.

This day we rode twenty-four miles at our full eaſe, and reached Killin before night.

Killin, though called a town, is in fact nothing more than a hamlet, conſiſting of a few ſcattered houſes at the extremity of Loch Tay. The inn is very plain in its appearance, but its accommodations are tolerably good, and the landlord is a very civil man. Over the chimney-piece of a ſmall parlour hung ſeveral native birds, which himſelf had carefully ſtuffed with ſtraw, among others a white wood-cock, which William Thornton purchaſed, as he alſo did ſome heath-cocks.

We were about ſitting down to table, when I was ſurprized with hearing a ſtranger, who wiſhed to ſpeak with me, call me by my name: I ſoon perceived from his manner and his language that he was a Frenchman; his perſon alſo was ſomewhat known to me. I told him

him that I thought I had ſeen him in Paris, but that I could not at the moment recollect who it was that I had the honour of addreſſing. "I am Bombelles," ſaid he; "I "travel like yourſelf, for pleaſure and in- "ſtruction. I am now on my way to *Port* "*Patrick*, where I deſign to embark for Ire- "land." It was from one of our ſervants that he heard of my being in the inn, where he had juſt arrived himſelf in one of Lord Bredalbane's carriages, at whoſe houſe he had gone to ſpend a few days.

I had never had any intimacy with M. de Bombelles. But two Frenchmen who meet each other in the wilds of Scotland are not long in forming an acquaintance; and we had beſides ſeveral common friends. From the courſe which M. de Bombelles purſued, as well as from a number of military and other charts which he had along with him, I judged that diplomacy and politics were more ſuitable to his taſte than the natural ſciences or the arts, and that he was probably charged with ſome particular miſſion, very foreign from the object of my ſtudies. I ought, however, to do M. de Bombelles's talents and activity the juſtice to ſay, that he neglected nothing

nothing which was in any degree intereſting to his country. This I had an opportunity of judging from ſome oſtenſible parts of a well-written journal, which he communicated to me at the time, and in which I ſaw ſeveral articles relative to rural economy and commerce, and likewiſe a curious phyſical fact reſpecting a very extraordinary flux and reflux, which had been recently ſeen in Loch Tay. I had already heard it mentioned in the Duke of Argyle's, at Inveraray; and M. de Bombelles, during his ſtay at Lord Bredalbane's, which is cloſe to the lake, received the beſt information that could be procured on the ſubject. I ſhall here inſert the note which he gave me, as it ſerved to direct my enquiries when I viſited the place on the following day.

"Between the hours of eight and nine in the "morning of the 12th of September (1784) "the water of the eaſtern part of Loch Tay "retreated to the diſtance of more than three "hundred feet from its ordinary limits, and "the whole of that ſpace, in which it was "generally three feet deep, was left quite "dry. The water on leaving it, ebbed to-"wards the weſt, but met with a contrary

"wave,

"wave, when the violence of the ſhock "raiſed both to the height of four feet, ac- "companied with much foam. The waters "thus ruſhing in oppoſite directions, formed "by their junction one vaſt wave, which "moved towards the ſouth, ſtill preſerving "a height of more than four feet above the "level of the lake, and remained in that "ſtate nearly ten minutes. This extraordi- "nary tide then began to ſubſide gradually, "and in about an hour and a half entirely "diſappeared. It is very ſingular, that during "this phenomenon, the ſky was perfectly "ſerene, and the air calm, and that there "was no perceptible motion at the oppoſite "extremity of the lake. Two days after, "the ſame appearance recurred; but one "hour later, and not in ſo remarkable a de- "gree."—*Note extracted from the Journal of M. de Bombelles, 9th of October* 1784.

M. de Bombelles * took the road to Inveraray; whilſt I made a little longer ſtay at Killin, to procure as much information as poſſible relative to the pearl-fiſhery of the river

* This is the perſon who was ſhortly after appointed Ambaſſador to Portugal.

Tay,

Tay, which here falls into the lake, to which it gives name.

The maſter of the inn, who obligingly exerted himſelf reſpecting every thing that could gratify my curioſity, brought me two fiſhers, whoſe particular employment was ſearching for pearls.

They conducted us to the river which runs in a very pure ſtream upon a bottom of ſand or pebbles, and they ſoon brought up ſeveral dozens of ſhells, from three and a half to four inches long, and a little more than two inches broad; their exterior colour was a deep brown, inclining a little to green. The upper ſhell was thick, and of a fine mother-of-pearl colour within, ſlightly tinged with roſe colour. I regarded this ſpecies as belonging to the *mia pictorum* of Linæus, or at leaſt, as very nearly reſembling it.

The fiſhers, in conſideration of a handſome reward, which we promiſed them, engaged to open theſe ſhells in our preſence upon the bank. But they ſtipulated for the reſervation of the pearls, if any ſhould be found, that they might ſell them to us at a ſeparate price; and to this propoſition we acceded.

Imagining

Imagining from this that we ſhould put a higher value on thoſe which might be found, while we were preſent; theſe artful practitioners brought with them ſome pearls, which they dexterouſly introduced into ſeveral of the ſhells in opening them. They appeared to be well exerciſed in this petty ſort of impoſition, which, however, I detected in a manner that aſtoniſhed and perplexed them, and that deſerves to be mentioned, as it depended upon a memorable fact with regard to one of the cauſes which contribute to the formation of pearls.

I deſired them to open the muſcles before my fellow-travellers, whilſt I went to amuſe myſelf with fiſhing ſome of them; but they were to inform me when they diſcovered any pearls. I was ſoon called and ſhewn a very fine pearl, perfectly round, and of a good colour. I looked at the ſhell and the pearl, and then told them, that the latter was not found in the muſcle ſhewed me. The fiſhers aſſured me that it was, and appealed to the teſtimony of my companions, who confirmed their aſſertion. I aſſured the latter, however, that they were deceived, and begged them to watch more narrowly the next time.

time. I retired a few ſteps, and a minute or two after I heard one exclaim, we have found another. I went up, and on examining the muſcle, I pronounced that the pearl had, for that time alſo, been ſlipped into the ſhell. The pearl was beautiful; but the price which they demanded for it was ſix times its value.

The fiſhers exhibited the utmoſt degree of aſtoniſhment; for, as I was at ſome diſtance from them, it was clear that I could not have obſerved their motions; my fellow-travellers who attentively watched them, were themſelves deceived, or at moſt entertained only a vague ſuſpicion; ſo well ſkilled were theſe men in an art which procured them a few additional ſhillings from travellers.

My art was ſo ſupernatural in their eſtimation, that they confeſſed the impoſition, and frankly ſhewed us ſome other pearls which they had in reſerve for the ſame purpoſe. They were very anxious to learn my ſecret, which would ſave them the pains of frequently opening a vaſt number of ſhells to no purpoſe, for they ſeldom found above one or two pearls in a week. But as they knew no other language than the Earſe, and not even ſo much as a word of Engliſh, I could explain

myſelf only by ſigns and geſtures; and, though my inſtructions were not very difficult, I doubt whether they were completely intelligible in a converſation of this ſort.

My ſecret conſiſted merely in examining attentively the outſide of the muſcles, and when neither of the parts had any cavity or perforation, but preſented a ſurface ſmooth and free from calloſities, I could pronounce, without any apprehenſion of being deceived, that there was no pearl in ſuch a ſhell. If, on the contrary, the ſhell was pierced with auger-worms, and indented by other worms of the ſame kind, there were always found pearls more or leſs valuable, or, at leaſt the embryons of pearls.

This obſervation, which I have found invariably true hitherto, was the reſult of ſome enquiries, in which I had been engaged a long time before, reſpecting the formation of that beautiful animal product. Bouffon introduces the information, which I communicated to him upon this ſubject, in his article upon pearls, page 125, vol. iv. of the *Natural Hiſtory of Minerals*. At that time I diſcovered that the pearl fiſh is attacked by two claſſes of enemies. One is a very ſmall auger-

worm,

worm, which penetrates into the inſide, near the edge of the valve, by working a longitudinal paſſage between the different laminæ that compoſe the cover. This ſmall channel, on extending to an inch or an inch and a half in length, doubles back in a line parallel to the firſt, and ſeparated from it by a very thin partition of ſhelly matter. Theſe two parallel lines diſcover the direction of the worm in entering and returning; which is alſo very diſtinguiſhable on the ſurface by two ſmall holes, cloſe to the edge, and in general near the mouth of the ſhell.

The paralleliſm of the two paſſages may be demonſtrated by introducing a pin into each orifice. At the inner extremity, however, there is a ſmall circular portion, formed by the worm in turning round.

As theſe ſmall channels or covert-ways are excavated in the part neareſt the mother-of-pearl, or ſilvery internal coat, the pearly juice ſoon extravaſates and produces protuberances in that direction. The cylindrical bodies thus formed may be conſidered as elongated pearls, adhering to the internal lining of the ſhell. When ſeveral worms of this kind penetrate near each other, and unite their labours, the

reſult is a ſort of pearly wen, with irregular protuberances, in which the iſſues of the paſſages which they have formed are eaſily diſtinguiſhable.

Another ſea-worm, much larger, and of the family of the multivalvous ſhell-fiſh, attacks the pearl ſhells in a much more ingenious manner. This worm is a pholas of the ſpecies of ſea dates. I have in my cabinet an oyſter from the coaſt of Guinea, pierced by one of theſe pholades, which are ſtill as they were found in the heel of the oyſter. The ſhells of theſe ſingular pholades are hinged in the form of a crooked bill. The ſmall hole which they bore reſembles the figure of a pear; and pearls of this ſhape are ſometimes found, which were in high eſtimation among the ancients, and are at preſent very valuable in the Eaſt-Indies: I ſhall give a more particular deſcription of this rare ſpecies of pholades in another work.

There are undoubtedly ſeveral other kinds of worms which pierce the pearl ſhell, and form cavities more or leſs round, in which the juice conſolidates into pearls.

It is this obſervation which has no doubt been made by others beſides me, that probably firſt

firſt ſuggeſted to ſome perſons concerned in the pearl fiſhery, the trick of making artificial perforations in the ſhells, and thus forcing them to produce pearls. At London I ſaw ſome ſhells brought from China, which muſt have undergone this operation: for the artificial hole was filled up with a piece of braſs wire, rivetted on the outſide of the ſhell like the head of a nail, and the part of the wire which pierced the interior ſhining coat, was covered with a well ſhaped pearl, which ſeemed as if ſoldered to its extremity. It is probable, that, with the Chineſe, who have been ſo long skilled in the arts, and whoſe aſtoniſhing and multiplied induſtry teaches us, that we are but a comparatively new people, this is not a diſcovery of very modern date.

Brouſſonet, with whom I had a converſation upon this ſubject in London, at the houſe of Sir Joſeph Banks, told me, that a perſon had aſſured him, that there is ſtill another method of obtaining pearls. The ſhell on which the experiment is to be made, muſt be opened with the greateſt care in order to prevent the animal from being injured. A ſmall

portion of the inner ſurface is then ſcraped off, and in its room is inſerted a ſpherical piece of mother-of-pearl about the ſize of a very ſmall grain of lead-ſhot. This globule ſerves as a nucleus to the pearly juice, which concretes around it, and at a certain diſtance of time, produces a fine pearl. He ſaid, that experiments of this nature had been tried in Finland, and repeated alſo in other countries.

From theſe obſervations it may be inferred that the production of pearls depends, perhaps, much more upon an external and accidental cauſe, than upon a natural ſuperabundance or extravaſation of the juice of which they are formed.

There are very excellent pearls found in the river ſhells of Loch Tay, if we may judge from ſome which the fiſhers of Killin offered to ſell us, at more than double the price of thoſe which are in current ſale. But theſe fine pearls are far from numerous; on the contrary, a very great number are found, which the jewellers reject, but which, though they may be not well calculated to form decorations for the ladies, are yet very intereſt-

ing

ing for the cabinet of the Naturaliſt, ſince they afford a confirmation of the theory which I have now mentioned. The greater part of theſe pearls have little or no luſtre; ſome are round, oval, or elongated and cylindrical; others are hemiſpherical and reſemble a button; ſeveral oblong ones have a contraction towards the middle which gives them the appearance of two joined together; others alſo are ſomewhat conical; and all are of a pretty large ſize, and of a pale red or brown colour. The end of the pearl touching the tegument of the ſhell which forms what is called mother-of-pearl, is ſo deeply impregnated with the ſhining ſubſtance, that it exhibits a ſingular contraſt with the ſurrounding brown colour of the other parts, and ſeems to derive additional ſplendour from it. This coating is of an orient bordering on roſe colour, which is extremely agreeable to the eye, and is therefore heightened in its effect by the contraſt.

Pearls of this kind are ſo ſeldom met with, that they might at firſt be taken for occulated agates prepared for being ſet,

or rather for *buſſonites*, particularly thoſe which have no mother-of-pearl. Their texture is very hard, and yields with great difficulty to the file.

The auger-worm, which occaſions the formation of the pearls of Loch Tay, pierces the whole thickneſs of the ſhell, which is of conſiderable denſity and of a fallow brown colour; and as the ſhelly juice oozes out from all parts of the orifice which the worm has formed, it neceſſarily reſults that the pearl muſt participate in the quality and colour of the ſubſtance of the ſhell, from the exterior layer to that which lines and embelliſhes its inner ſurface.

Hence originate thoſe rude but ſingular gems above-mentioned, which have only a thin coating of mother-of-pearl upon one ſide. There are, however, ſome inſtances in which the pearl is pure and brilliant throughout; proceeding, probably, from an extravaſion of the interior coating only; which may have been occaſioned by another kind of auger-worm attacking the ſhell ſolely in the direction of that coating. It is the province of thoſe Naturaliſts, whoſe attention

tention it has more particularly engaged, to inveſtigate more profoundly this very intereſting ſubject, our knowledge of which muſt yet be conſidered as nothing more than a rude outline.

CHAP.

CHAPTER X.

Kenmore.—Extraordinary Flux and Reflux of Loch Tay.

We now took leave of the pearl fiſhers and our landlord, who obligingly gave us all the information in his power, and proceeded on our way to Kenmore, along the left bank of the Tay, which is ſkirted on both ſides by granitic mountains, that confine the view within a very narrow compaſs. The foot of the mountains is tolerably well cultivated; but the only produce is oats, which are not reaped till about the middle of October. Theſe oats a very tall; they were only beginning to be cut down at the time I paſſed; I meaſured ſeveral ſtalks, and found the ſhorteſt to be four feet high, and the longeſt five feet ſix inches *.

The

* I do not entirely agree with Knox, who viſited this place ſometime after me, when he ſays, "that its banks "on both ſides are fruitful, populous, and finely diverſi-"fied by the windings of the lake, and the various ap-"pearances of the mountains." The views upon both ſides

The lake is about fourteen miles long, and about a mile of mean breadth. I had no certain information of its depth*. It abounds in fiſh, and its waters are ſoft and clear.

The mountains which are neareſt the lake, and encloſe it on all ſides, are compoſed of a ſchiſtus micaceous rock, intermixed with felt ſpar and quartzoſe matter; the latter is moſt abundant. In this rock I found a few garnets, of a bad configuration and coarſe texture.

On reaching the ſouthern extremity of Loch Tay, we found on a very agreeable ſpot a commodious inn, ſeveral private habitations, a new-built church, and a bridge thrown over a ſmall river which iſſues from the lake; the whole is ſurrounded with trees, which enliven this fine little landſcape. The name of the place is Kenmore.

Here the traveller begins to perceive that he approaches the open country, and is ſoon to emerge from the barren mountains of the

ſides are too confined, and exhibit only the ſame dreary aſpect, and a few ſcattered patches of oats, preſent only the image of an ungrateful ſoil.

* The ſame author, ſpeaking of the depth of the lake, ſays, "that it varies from fifteen to a hundred fathoms;" this appears to me very extraordinary.

north

north of Scotland The air which he inhales, the cultivated face of the ſoil, the encreaſing number of inhabitants, every thing conveys the intelligence; and this firſt gradation of change fills his ſoul with a ſentiment of mild delight, which I cannot better expreſs, than by comparing it to that which we feel on the return of ſpring, though at this time it was the end of autumn. But it might be ſaid that all was wintry, wild, dreary and ſterile in the region which I had traverſed.

My firſt care, on arriving at Kenmore, was to procure the moſt exact accounts reſpecting the flux and reflux of the lake, which happened on the 12th of the preceding September; as it was near this that the phenomenon firſt took place, and it was here, therefore, that it could have been obſerved with moſt advantage.

The maſter of the inn to whom I applied for information, and who underſtood Engliſh, tranſported with the reputation which that event had conferred on the place of his reſidence, conceived that I had come from France, for the expreſs purpoſe of ſeeing a country, which was, in his opinion, ſo juſtly deſerving of celebrity. He, accordingly, gave

gave me the moſt cordial reception, for which I feel pleaſure in this opportunity of expreſſing my grateful acknowledgment.

" I cannot myſelf," ſaid he, " have the " pleaſure of explaining how, what you wiſh " to be informed of, happened, becauſe I " was abſent from home, on the firſt day of " the lake's motion. But I can direct you " to two perſons who ſaw, and attended to, " the whole of its progreſs, and who will " ſhew on the ſpot how it proceeded. One " of them, in particular, who is a lad of ſome " acuteneſs, has carefully obſerved all the " facts; and you will have reaſon to be ſatisfied with what he may tell you. You may, " however, examine both; I ſhall go and " order them to accompany you, and to anſwer all your enquiries; for they are both " my ſervants."

The one was called James Allan, the other John M'Kenzie. The latter was the younger of the two; but he ſeemed to poſſeſs a greater portion of intelligence, and a ſpirit of obſervation more rational, and leſs diſpoſed to the admiſſion of the marvellous than his comrade.

M'Kenzie

M'Kenzie told me, that at nine of the morning of the 12th of September, the ſky being ſerene and the air calm, a peaſant who had gone to waſh his hands in the part of the lake where the river iſſues, obſerved the water leaving the bank in a very perceptible manner, which obliged him to advance a few paces farther; but it ſtill continued to retreat from him. This appearance gave him ſo much ſurprize, that he haſtened to inform his neighbours of it; one of whom then told him, that, at ſun-riſe, having heard a noiſe ſimilar to that of a ſudden blaſt of wind, he went to the window, when, to his no ſmall aſtoniſhment, he perceived the water receding from its banks, as if acted on by the impulſe of a violent hurricane; but finding the air perfectly calm, his aſtoniſhment roſe to the higheſt degree.

M'Kenzie having told me that he had theſe accounts from the peaſant, I requeſted to ſee the latter. He was immediately ſent for, but he had previouſly ſet out for a village ſix miles off. Having, therefore, had no opportunity of converſing with him myſelf, the details which I am to communicate, cannot be delivered as poſitive facts. Peaſants being in general ſtrongly inclined to the mar-

marvellous, the noiſe, which, according to his account, preceded the ebbing of the waters, appeared to me ſomewhat apocryphal. M'Kenzie entertained the ſame opinion.

The latter, continuing his relation, ſaid that he was not informed of this extraordinary motion of the lake until ten of the morning on which it firſt appeared. He inſtantly repaired to the brink of the lake, where he remained more than an hour and a half, obſerving the facts as they occurred with the moſt minute attention. During this period, he plainly ſaw the water ebb and flow ten times ſucceſſively; and the ſame alternate motion continued for the whole of that day.

He communicated to me all theſe circumſtances on the edge of the lake, and on the ſame ſpot upon which he ſtood when making his obſervations. He pointed out a large ſtone pretty far in the water, as the limit of its retreat.

As this part of the lake was little more than three feet in depth, I cauſed the ſpace between the ſtone and the water's edge to be carefully meaſured, and found it one hundred and fifty French feet. But John M'Kenzie did

did not omit to inform me, that when the phenomenon happened, the water was not ſo high upon the bank by eight feet. To prove this, he pointed to a ſtake which he had driven into the ground at the level at which it then ſtood, and which was about eight feet below its preſent margin. The exact meaſurement, therefore, of the ſpace abandoned by the water, was one hundred and fifty-two feet. From this, it ſhould ſeem that the account which M. de Bombelles received at Lord Bredalbane's, ſtating this ſpace at three hundred feet, requires to be corrected. It ought, indeed, to be obſerved, that as M'Kenzie was not on the ſpot until an hour after the water began to move, it is not improbable that the firſt impulſe, which he did not ſee, might have been much ſtronger, than thoſe which ſucceeded it. But as there is no proof to ſupport this ſuppoſition, whilſt the fact which fell under M'Kenzie's obſervation is aſcertained by preciſe meaſurement, it is more adviſeable to adopt his account.

The lake exhibited the ſame phenomenon on the following day, and likewiſe on the third day, but not in ſo frequent and regular a manner.

No

No body obſerved its appearances in the night; nothing, therefore, is known of what happened during that time.

M'Kenzie ſaid, that during the ebb, the water receded from the bank without any violent or ſudden agitation, but with the moſt gentle motion, until it reached the large ſtone, from which it returned to its former verge in the ſame ſlow and gradual manner.

The inhabitants of Kenmore, whom I had acceſs to conſult, all agree with M'Kenzie in the following facts:

1ſt. The motions of the lake during the fourth day, happened only at very diſtant intervals. 2dly. On the fifth, ſixth and ſeventh days, there was no ebb of the waters. 3dly. On the eighth, the motion appeared for a few hours only; and this was the caſe during two whole weeks, with intervals of two or three days, entirely motionleſs. 4thly. The motion abated gradually, and the lake reſumed its former ſtillneſs. 5thly. During the whole of this time, there was no violent wind, nor the ſlighteſt ſhock of earthquake.

Theſe are the facts which are moſt deſerving of credit, and I conceive it not improper to introduce them here, for the purpoſe of diſpelling thoſe additions of the marvellous, with which the Engliſh papers did not fail to embelliſh them. Having myſelf carefully collected the preceding accounts on the ſpot, they may be ſafely confided in. This is not a ſuitable place for entering into an examination of the cauſes which might have occaſioned this wonderful flux and reflux in a lake where ſuch a phenomenon had never occurred before. Similar phenomena have, indeed, taken place in other lakes. But we have not as yet a ſufficient number of facts, and thoſe which are already known have not been collected by perſons ſufficiently exerciſed in the difficult art of obſervation, to enable us to form any ſatisfactory ſpeculations upon the ſubject.

We had ſcarcely left Kenmore on our way to Dunkeld, when we were agreeably ſurprized to find ourſelves on a road bordered with fine Scottiſh and American pines, and other beautiful evergreens, kept in good order,

diſpoſed

diſpoſed with taſte, and diffuſing over the ſcene an attractive and enlivening appearance, which announced the vicinity of ſome great habitation.

About a mile farther, we came to the verge of a vaſt park, decorated with plantations of various kinds in the midſt of verdant lawns, and divided through its whole length by the river Tay, over which are thrown two or three bridges of different conſtructions. Numerous herds of deer feed in this delightful place; ſheep, fine looking beeves, and horſes of various breeds, give the whole an air of abundance, uſefulneſs, and taſte, which diſplay at once the enlarged mind and high fortune of the proprietor. A vaſt pile of building, partly in the gothic and partly in the modern ſtyle, cloſed this magnificent proſpect. It is the reſidence of the Earl of Bredalbane.

I had heard ſo much praiſe of the character of this nobleman, whoſe chief occupation is to ſpread induſtry and happineſs around him, that I was extremely ſorry I had not procured a letter of introduction to him, with which the Duke of Argyle would have certainly obliged me, had I requeſted

it. But it did not form part of my original plan to pass through Tindrum or Kenmore; on the contrary, it was my intention to return by Inveraray; and it was not until my second arrival at Dalmally, that I resolved to change the order of my journey, with the view of obtaining authentic accounts respecting the ebb and flow of Loch Tay. I regret the loss of this opportunity of acquiring a knowledge of the extensive improvements in agriculture and rural economy, conducted with so much success by the Earl of Bradelbane, and of becoming acquainted with a man who enjoys so excellent a reputation, and is so useful to his country.

We dined at a very good and commodious inn, about a mile from Dunkeld, opposite to that agreeable little town, and built on eminence surrounded with woods and rocks. A vast ruinous gothic church gives Dunkeld a very picturesque appearance.

We reached Perth a little late in the evening, by a road extremely rugged and fatiguing.

CHAP-

CHAPTER XI.

Perth, its Harbour and Manufactures.—Mr. M'Comie, Profeſſor of Mathematics; Mr. M'Greggor, Profeſſor of the French Language at the Academy.—Volcanic Mountain of Kinnoul.—The Agates found upon it.

THE ſmall city of Perth ſtands in a very agreeable ſituation on the river Tay, which the tide enters to a conſiderable diſtance, and renders navigable for ſmall veſſels. It is in a pretty flouriſhing condition, and contains a population of about twelve thouſand ſouls.

The ſtone bridge over the Tay was conſtructed by the ſame perſon who built that of Blackfriars, at London. It is very well executed, but is rather narrow for its length.

William Thornton had an acquaintance at Perth, of the name of M'Comie, who was profeſſor of Mathematics in the college, which bears here the title of academy. We paid him a viſit, and ſuch was his goodneſs and complaiſance, that he was conſtantly with us during our ſtay at Perth, where we remained

mained nearly a week. We derived the moſt uſeful ſervices from him, as well as from one of his colleagues, Mr. M'Gregor, profeſſor of the French Language, who had received his firſt education at Paris, and who was kind enough alſo to favour us with his company, and to conduct us to ſeveral manufactories.

Before the reformation took place in England and Scotland, the town of Perth, where the catholic worſhip reigned in all its ſplendor, contained ſome conſiderable religious foundations, beſides a number of churches. Of theſe, the greater part have ſince been laid in ruins, or converted into churches for the uſe of the preſbyterians. In ſeveral of the ſtreets are ſeen ſome fine gothic facades, which once belonged to cathedrals, chapter-houſes, monaſteries, and nunneries. Theſe remains of monuments, conſecrated to a worſhip which formerly flouriſhed ſo vigorouſly in the three kingdoms, announce that religions, as well as governments, have their periods of inſtability and revolution, which inceſſantly ſucceed each other at intervals of longer or ſhorter extent, but which, when the impulſe is once given, no human power is

able

able to arreſt: So true is it, that in morals, as well as in phyſics, there is nothing durable in this world.

Machines for carding and ſpinning cotton, had been introduced at Perth only a little before our arrival there. We ſaw the firſt of them at the manufactory of an individual who had cauſed them to be conſtructed at Mancheſter. He found it impoſſible, however, to convey them out of that town but during the night; ſo jealous are the manufacturers of Mancheſter of this happy invention of Arkwright, which has given ſuch extenſive celebrity and immenſe advantages to its commerce.

The moſt conſiderable manufactures of Perth are fine linen, thread, and flax; and ſome very excellent articles are produced in this line. Here I ſaw a loom for weaving very large bed ſheets, in one piece, by means of a ſhuttle fixed on ſmall rollers. A pair of theſe ſheets, made of very fine linen, coſts from a hundred and fifty to a hundred and ſixty livres of French money.

I purchaſed at a table-cloth manufactory a dozen ſmall napkins and a breakfaſt-cloth. They were of an excellent quality, and coſt

me four Louis-d'or. I was happy to have an opportunity of carrying them to France by way of models.

I was alſo ſhewn, with an air of myſtery, at the houſe of a rich manufacturer of fine linen, an inſtrument as ingenious as uſeful for aſcertaining the fineneſs of texture with the greateſt preciſion.

It conſiſts of a kind of ſmall microſcope of a very ſimple conſtruction, which, inſtead of an object glaſs, has a round hole, about three lines or a little more in diameter. The glaſs or lens correſponds to that circular aperture at the diſtance of the focus. The inſtrument is placed upon the cloth, the threads of which are ſo magnified by the lens, that the obſerver can eaſily count how many are contained within the ſpace of the hole. It is evident that the greater the number, the finer is the fabric of the ſtuff. It likewiſe ſhews whether the thread be too flat or otherwiſe. The artiſan who is acquainted with the mode of uſing the inſtrument, if he ſhould preſent a piece of cloth which he charges as fine, has no admiſſible excuſe when it is found to be of a coarſer quality, by making himſelf count the number of threads with this inſtrument.

The

The weavers, therefore, by its means, have become accuſtomed to the greateſt preciſion.

The wholeſale dealers equally employ it in their purchaſes. They have, therefore, good reaſon not to wiſh that every one ſhould be acquainted with it; becauſe, with its aſſiſtance, they can tranſact their buſineſs on a ſurer footing than thoſe who are obliged to depend upon the naked eye. I brought one of theſe inſtruments to France, where they were ſoon multiplied.

VOLCANIC MOUNTAIN OF KINNOUL, IN THE VICINITY OF PERTH.

The deſire of examining the hill of Kinnoul, was what principally determined me to paſs through the town of Perth, from which it was only two miles and a quarter diſtant. I was therefore able to make ſeveral viſits to it during the three days that I ſtaid at Perth.

The lavas and agates which I collected there were very numerous. I ſpent half a day and a whole night in ſorting and ticketing them. The number of the fineſt ſpecimens were doubled, and in ſome caſes tripled, for the

the purpoſe of diſtributing them among my friends. The whole filled a large cheſt*.

Scarcely had I croſſed the bridge of Perth, where I obſerved ſome lavas in ſtrata, unformed maſſes, and ill-ſhaped priſms. Theſe different currents proceeded from ſeveral eminences forming part of the mountain of Kinnoul, the baſis of which, occupied a very conſiderable extent. Purſuing the road along the Tay, with the mountain on my left, for two miles and a quarter, I came to a very ſteep and almoſt perpendicular rock, nearly ſix hundred feet high, and on the very edge of the road. The traveller ought to make directly for this place, becauſe it is the richeſt in agates and other productions worth collecting.

Though the mountain appears extremely ſteep in that quarter, one may, notwithſtand-

* This cheſt, together with my whole collection of the products of Scotland and the Hebrides, which was in the beſt order, was loſt on a ſand bank, near Dunkirk. The veſſel which carried them from Leith ſunk, and only the crew were ſaved. By this unfortunate accident, I have loſt all the fruits of a toilſome journey, except a ſmall box of the moſt remarkable articles, which I brought along with me in my carriage. But I had carefully copied into one book the liſts of all my collections,

ing,

ing, clamber up to its ſummit, with a little precaution. But, for this purpoſe, it is neceſſary to have a ſtout ſtick, armed with an iron ſpike; nor muſt the adventurer heſitate to ſcale the craggy rocks. This labour, however, may be ſaved by approaching in the direction juſt mentioned, where the forms and different diſpoſitions of the ſtrata are in a manner plainly legible in its ſide, which is completely expoſed to view. The following is a note of the different articles which I collected:—

VOLCANIC MINERALOGY OF KINNOUL.

1. Black baſaltes, of a fine grain and homogeneous texture, forming an extenſive current, adhering to a ſtream of black porphyric lava, with a baſis of trapp, and ſo diſpoſed as to leave no doubt that the baſaltic lava in this ſtate derives its origin from porphyric lava. The latter has preſerved its cryſtals of felt ſpar, which are ſmall but well defined, whilſt the baſaltic lava has loſt its cryſtals, which are amalgamated and blended with the very baſis of the porphyry, either by a ſudden and violent, or a long continued combuſtion.

On

On examining the baſaltic lava with a microſcope, ſmall cryſtals are ſtill ſeen in ſome parts of it, which are not entirely amalgamated with the lava; their courſe may be pretty well traced, even from their exterior appearance. Small ſplinters of the porphyric lava, on being urged with the blow-pipe, afford an enamel of a beautiful black colour; and the baſaltic lava yields a vitreous matter or enamel in every reſpect ſimilar.

2. The ſame baſaltic lava, divided into large priſms, very irregular, though well defined. Theſe priſms preſent nothing in the fracture but an homogeneous lava, without the leaſt cryſtal of felt ſpar.

3. Baſaltic lava of a delicate green colour, very hard, ſometimes ſonorous on being ſtruck, diſpoſed in a large current. This greeniſh lava tranſverſely interſects a current of black compact lava. Its greeniſh colour is owing to a particular modification of iron. I was well acquainted with the earth of Verona, which has its origin from a very remarkable decompoſition of a volcanic product; but I had never before ſeen a ſtratum of compact, hard, and ſonorous baſaltic lava, which had that greeniſh appearance.

4. A qua-

4. A quadrangular prism, well defined, in excellent preservation, and of an agreeable delicate green colour. I found it among the wreck of a considerable mass of lava of the same colour, which had fallen from the top of the precipice.

5. The same greenish basaltic lava in a tabular form.

None of the green coloured lavas were magnetic.

6. Compact porphyric lava, of a black ground, studded with a number of crystals of white felt spar, which have not undergone any alteration. This lava is strongly magnetic.

7. A quadrangular prism of blackish porphyric lava, magnetic, with a knob of flesh-coloured agate on one of its faces.

8. Porphyric lava, mouldering into gravel, and forming extensive beds. I have no doubt that if this gravelly lava, which is not very hard, were reduced to powder by the aid of stamping-mills, like those used in Holland, for pounding the lavas or *tras* in the environs of Andernach, it would afford a puzzolano, an excellent cement, of great and indeed indispensable use for building in water.

9. Compact

9. Compact porphyric lava, with a ground of deep iron grey inclining to violet, intermixed with particles of green ſteatites, ſome knobs of variegated agate, and a few globules of white calcareous ſpar, diſpoſed in a large current.

10. Compact porphyric lava, magnetic, with knobs of white, and ſometimes fleſh-coloured calcareous ſpar, and globules of the fineſt green-coloured ſteatites.

11. Reddiſh-coloured compact, porphyric lava, forming a layer between two currents of baſaltic lava of a delicate green colour, and adhering to them.

12. Black porphyric lava; magnetic, interſected with belts of red porphyric lava, reſembling the red porphyry of the ancients. This lava, in which both the lavas are united, is very remarkable.

13. A geode of agate, internally ſtudded with ſhining cryſtals of violet-coloured quartz, in the form of hexagonal pyramids, incruſted with compact porphyric lava, of a dark brown colour, a little inclining to violet, with ſome knobs of white calcareous ſpar, and ſeveral globules of agate and green ſteatites.

14. A geode

14. A geode of bright red agate, having in its interior a brilliant cryſtallization, of white quartz of the greateſt purity. This geode is found in a black porphyric lava, which is magnetic.

15. Eye-ſpotted agate of a delicate roſe colour, incruſted with dark brown compact porphyric lava, intermixed with globules of green ſteatites. This ſpecimen is very agreeable to the eye.

16. Red ſtriped agate, incloſed in black porphyric lava, ſtrongly magnetic.

17. Semi-tranſparent agate of the moſt vivid red, in a porphyric lava inclining to violet, with knobs of white calcareous ſpar, and globules of a delicate green coloured ſteatites.

18. A geode with a cruſt of calcedonious blueiſh occulated agate, internally ſtudded with cryſtals of ſparkling quartz. In the interior of the cryſtals are ſeen particles of black lava taken up during the proceſs of cryſtallization; from which it is beyond doubt that the formation of the geodes was poſterior to that of the lava.

19. A lump of white calcareous ſpar, ſparkling, diſpoſed in rhomboidal laminæ, amidſt

amidſt a ſlight envelope of ſteatites of a fine green colour. The whole is incruſted in a black compact lava, magnetic, and more nearly reſembling baſaltes than porphyry.

20. A lump of green ſteatites, enveloped with a ſlight covering of white calcareous ſpar, in a porphyric lava, of a brown colour, inclining to violet. This fragment is the reverſe of the preceding.

Such are the moſt intereſting articles which I collected on the mountain of Kinnoul. I have no doubt that a longer ſtay would have conſiderably augmented my collection. But others may perfect what I give here as a ſketch only. I had neither direction nor guide to regulate my reſearches on that mountain. It was not even ſo much as conjectured to be volcanic at Perth. All that was known there reſpecting it was, that ſome Edinburgh lapidaries viſited it from time to time in queſt of agates, which they poliſhed and turned to an object of a petty traffic.

CHAP.

CHAPTER XII.

St. Andrews Univerſity.—Library.—Old Churches.—Natural Hiſtory.

WE ſet out from Perth for St. Andrews by way of the ſmall town of Cupar in Fife, where we changed horſes. We accompliſhed this journey in ſeven hours. All the hills on the road are formed of blackiſh gravelly lava and baſaltes.

We had letters of recommendation to Mr. George Hill, profeſſor of Greek, and Mr. Charles Wilſon, profeſſor of Hebrew, in the univerſity of St. Andrews. We waited upon theſe gentlemen on the following day, and both of them exerted themſelves with the greateſt eagerneſs to oblige us, and to procure us ſuch information as could gratify our taſte or curioſity.

UNIVERSITY.

This univerſity recommends itſelf to the notice of the traveller by the name of the celebrated Buchanan, who was profeſſor of philoſophy there.

There were formerly * two colleges which are now conſolidated into one. There was a profeſſor of the Latin language in each of the colleges; one of the profeſſorſhips is now ſuppreſſed, and a chair of Natural Hiſtory ſubſtituted in its ſtead. The Greek profeſſorſhip is alſo of recent erection.

The revenues of the profeſſors, who are thirteen in number, amount together to fifteen hundred pounds ſterling, which gives a fixed ſalary of nearly three thouſand French livres for each place.

The names of the profeſſors are as follows:

Joſeph M'Cormick, Principal;
James Flint, profeſſor of Medicine;
John Cook, Moral Philoſophy;
George Forreſt, Natural Philoſophy;
Nicolas Vilant, Mathematics;
John Hunter, the Latin language;
George Hill, the Greek language;
W. Barron, Logic;
Hugh Cleghorn, Civil Hiſtory;

* There were formerly three colleges, namely, St. Salvador's, St. Leonard's, and St. Mary's; the two former of which have been united. Tranſlat.

Dr.

Dr. J. Gilleſpie, } Divinity;
Dr. Henry Spence, }
William Brown, Church Hiſtory;
Ch. Wilſon, the Hebrew language.

LIBRARY.

The college library is open to the public for ſeven months in the year, during which they are at liberty to enter it every day at ſtated hours. There are likewiſe ſome other days of the year upon which it is opened. The revenues appropriated to the maintenance of this eſtabliſhment ariſe from ſome tythes belonging to an old eccleſiaſtical foundation which were ſeized upon by the crown and afterwards aſſigned to this library. Their produce does not amount to more than thirty-ſix pounds ſterling, a ſum nowiſe adequate to the moſt urgent current expences. But ſome caſual emoluments from the admiſſion of graduates increaſes the total revenue of the library to the ſum of an hundred and fifty pounds ſterling. The number of books is not more than eleven or twelve thouſand. They are almoſt all modern, with the exception of ſeveral bibles and ſome devotional books, among which there is nothing extraordinary.

I ſaw nothing worthy of notice but a manuſcript which was ſomewhat intereſting from its excellent preſervation; it was a Saint Auguſtin of the thirteenth century, written on vellum. There is alſo in the ſame apartment, as an object of curioſity, an Egyptian mummy in a very bad ſtate, without even its ancient caſe, and appearing to me to be one of thoſe which the Arabians join together of patches and fragments for the purpoſe of ſelling them to ſuch as are unable to detect the impoſition.

ANCIENT CATHOLIC CHURCHES.

This city, during the reign of the catholic religion, poſſeſſed the archiepiſcopal pre-eminence. The famous Cardinal Beaton was one of its archbiſhops. Vaſt and ſuperb churches announced the opulence of their founders, and the generous ſacrifices of a people powerfully attached to their mode of worſhip. The ruins of all theſe monuments, of which there are ſtill ſome fine remains, give the city an aſpect of antiquity which forms a ſingular contraſt with the ſimplicity, the modeſty, and I had almoſt ſaid, the poverty of the greater part of its preſent habitations.

The

The church of the ſecond college, as it is called, which is ſtill ſtanding, appears to be very ancient. The ſteeple is a high tower, of a quadrangular form, and of a good and ſolid conſtruction. The church is ſpacious, and in the gothic ſtile of building; it is conſecrated to the Preſbyterian worſhip, and contains the tomb, now partly in ruins, of an archbiſhop who founded the univerſity of this city. This monument is built in the wall with ſtone of a very common kind, and exhibits nothing remarkable. On an occaſion of making ſome repairs, there was diſcovered within it * a church mace, of gilt copper, four feet long. This enſign of dignity, which I was permitted to examine, is charged with gothic ornaments finely executed, but in a bad taſte. It is covered with ſmall ſteeples, and niches occupied by monks with cowls on their heads and in an attitude of prayer. The angles are filled with winged angels placed in pulpits and in a preaching

* The monument here referred to is the tomb of biſhop Kennedy, within which were found ſix maces; three of them were diſtributed among the other Scotch univerſities, and the remaining three are preſerved in that of St. Andrews. Tranſlator.

poſture. Gothic medallions are ſuſpended all round it by way of ornament; and the whole is ſurmounted with a figure of Chriſt on foot, and ſtanding upright in a pyramidal niche. This work, to judge by its ſtile, may be from two hundred and ſixty to three hundred years old. It can only ſerve to give us an idea of the arts, and of the bad taſte of the time.

We likewiſe viſited another church, which, from an inſcription on one of its doors, appeared to have been built in the year 1112. In this church we ſaw a grand mauſoleum of white marble, repreſenting an archbiſhop, as large as life, kneeling, and an angel placing a martyr's crown on his head. A ſpacious baſſo relievo, at the foot of this monument, exhibits the ſame archbiſhop attacked by ſome men who aſſaſſinate him. A young girl in tears, detained by ſome other perſons, near a coach, which they have ſtopped, makes the moſt violent ſtruggle to go to the aſſiſtance of the archbiſhop, in whom ſhe ſeems to have the moſt tender intereſt. Deſpair is ſtrongly marked in her geſtures and her figure.

This ſcene inſtantly brought to my remembrance the diſaſtrous event which happened

pened to Cardinal Beaton *, who was killed on the 29th of May, 1546, by Norman Leſly, eldeſt ſon of the earl of Rothes, accompanied with fifteen conſpirators. Beaton, was doubtleſs a man of great talents, but at the ſame time ambitious, inſolent, a cruel enemy of the Reformers, and had the abominable inhumanity to cauſe the unfortunate George Wiſhart to be burnt alive.

I was aſtoniſhed at ſeeing a monument of this ſort permitted to remain in a church now applied to the uſe of the reformed religion, which holds Beaton in ſuch abhorrence. But my aſtoniſhment ſoon ceaſed on learning that this monument, the ſculpture of which was executed in Holland, had been erected by the relations of the archbiſhop a long time after his death, and that they had appropriated a certain yearly ſum for keeping it in repair. It thence reſults, that in order to obtain this ſum, the mauſoleum muſt be allowed to exiſt as a work that has received their complete

* The author's conjecture has been in this inſtance erroneous. This monument is a repreſentation of the death of archbiſhop Sharp, who, in revenge for his cruel perſecutions of their ſect, was aſſaſſinated by nine preſbyterian enthuſiaſts, on the 3d of May, 1669, on Magus Moor, in the vicinity of St. Andrews.—Tranſlator.

ſanction.

Sharpe should be spelt with

ſanction. But it alſo happens that the monument receives no repairs, though it begins to be greatly in want of them; and the money is very probably applied to the uſe of the church. No part of it, however, will be demoliſhed as long as the yearly allowance ſhall continue to be paid: an evident proof that every where, and in every caſe, gold has the power of reconciling the moſt oppoſite opinions.

It would appear that the relations of cardinal Beaton had no wiſh to conceal that the holy archbiſhop was a father, ſince his daughter is repreſented in tears, with her arms extended towards her father, and forcibly held by two of the conſpirators, at the moment when the others accompliſh the murder. But the ſolemn Robertſon informs us, in his hiſtory of Scotland, that the prelate openly acknowledged this daughter. "Car-
"dinal Beaton," ſays he, "with the ſame
"public pomp, which is due to a legitimate
"child, celebrated the marriage of his natu-
"ral daughter with the earl of Crawfurd's
"ſon;" and in a note he ſays, "the marriage
"articles, ſubſcribed with his own hand, in
"which he calls her *my daughter*, are
"ſtill

"ſtill extant," vol. i. p. 88, of the 8vo. edition.

The facade of the church of St. Leonard, though gothic, poſſeſſes an elegance and grandeur which are very impreſſive. This was the chapel of the college which has been diſſolved. Johnſon in his *Journey to the Weſtern Iſlands of Scotland*, complains, that he was always by ſome civil excuſe hindered from entering it, and that in fact it had been converted into a green-houſe. I was not more fortunate than Johnſon. But I found that the area in front and on one ſide of the chapel was turned into a kitchen garden; and from what I ſaw myſelf, it is not improbable that the houſe of God has become the houſe of the gardener, and that it affords a ſhelter to his carrots and his turnips during the winter.

By way of compenſation, however, I viewed at my eaſe, the ruins of the cathedral and the adjoining palace, which formed the reſidence of the archbiſhop. Both theſe vaſt edifices, ſtood on an elevated ſituation, which commands a full proſpect of the ſea. The palace was, indeed, ſo cloſe to it, that the waves

waves have undermined a part of its foundations.

The cathedral, as far as can be eſtimated from its remains, without compriſing ſome adjoining chapels, a kind of cloiſter, and other ſubordinate buildings around it, was three hundred and fifteen feet long, and ſixty feet broad. Nothing can be more remarkable and intereſting than this ruin. Not only does it bear the impreſſion of time and neglect, but it alſo diſcovers the ſtrongeſt marks of a religious and fanatical zeal which roſe to the moſt abominable phrenzy.

Towers of the moſt ſolid conſtruction overthrown; columns broken in pieces; the remains of magnificent gothic windows ſuſpended as it were in the air; pyramidal ſteeples, more than a hundred feet high, of ſtones ſo ſolidly laid, that it being difficult to demoliſh them entirely, they were pierced through and through and indented in every direction; winding ſtair-caſes which ſeem to ſtand without any foundation; altars heaped upon altars under the remaining vaults; fragments of friezes, capitals, entablatures, ſcattered among ſepulchral tablets, and mutilated tombs; the wreck of cloiſters, chapels, porticos;

ticos; and ſome columns ſtill maintaining an erect poſture in the midſt of ſuch wide-ſpread havock: ſuch is a rapid sketch of the picture preſented by theſe extenſive ruins, which ſtrike the man, who beholds them for the firſt time, with dread and aſtoniſhment.

The traveller is at firſt loſt in conjecturing whether a terrible earthquake, a long ſiege, or an invaſion of barbarians, was the cauſe of ſo much devaſtation. A quadrangular tower an hundred feet high, well conſtructed, and in perfect preſervation, riſes ſingle and unimpaired by the ſide of theſe vaſt ruins. It is difficult to account for this contraſt.

At the view of this ſcene one is irreſiſtibly led into a train of melancholy reflexions, on the maladies of the mind, which degenerate into madneſs and mortify our reaſon. Are theſe frenzies, theſe deliriums of the intellect, like corporeal diſeaſes, inſeparable from the condition of humanity? If the affirmative be true, mankind in the groſs, are the moſt ferocious, and at the ſame time the moſt miſchievous of animals, and one might be tempted to renounce this life at once, were it not for a few choſen individuals who encourage one to ſupport it.

I was

I was assured that the quadrangular tower which stands entire in the midst of these extensive ruins, has existed for upwards of eleven hundred years. It was probably a light-house in former times; at present it is a memorial only of the feudal rights which the king has over the city; and on this account it is preserved with great care. I mounted by an inside stair-case to the highest balcony; whence there is a view of a wide extent of country.

Blaauve has inserted in his large atlas very exact engravings of the principal monuments of St. Andrews, as they appeared at an epoch when they existed in all their splendour. Mr. Cleghorn assured me, that the materials which had been furnished to Blaauve were very correct.

These same monuments, in their ruinous state, have been carefully engraved in four plates, by Pouncy, from drawings of striking effect, by J. Oliphant. I saw a collection of them at the house of the college librarian, who would not agree to sell them for any money. He carefully preserved them in frames of glass; he said they were now very scarce, and hardly to be met with for sale.

Before

Before a crowd of fanatics, inflamed to fury by the homicidal ſermons of the gloomy Knox, carried the torch of deſtruction to men and things, through that unfortunate city, it was a place of conſiderable eminence; letters and the ſciences flouriſhed within its walls, and rich and numerous eſtabliſhments were dedicated to public inſtruction.

The blow which it received from the hand of barbarians, ſuddenly changed its appearance. It requires ages to build, but an inſtant only to deſtroy. This city, notwithſtanding the length of time which has elapſed ſince the date of its misfortunes, ſtill appears as if it had been ravaged by the peſtilence. Its ſtreets are large and commodious; but are every where covered with graſs. All is ſadneſs and ſilence. Its inhabitants, ignorant of commerce and the arts, preſent only the image of indolence and languor. This ſtate of inactivity has its correſpondent effects on the population; for though the place is ſtill capable of lodging from fourteen to fifteen thouſand people, it does not contain at moſt above three thouſand.

I therefore join in the opinion of Johnſon, who, indignant at the deſolate condition in which

which the Engliſh government ſuffers eſtabliſhments conſecrated to inſtruction to remain, exclaims, "It is ſurely not without "juſt reproach that a nation, of which the "commerce is hourly extending, and the "wealth increaſing, denies any participation "of its proſperity to its literary ſocieties; "and while its merchants or its nobles are "raiſing palaces, ſuffers its univerſities to "moulder into duſt."

SOME OBJECTS OF NATURAL HISTORY IN THE ENVIRONS OF ST. ANDREWS.

The rock on which the caſtle of this city ſtood, is in many places at leaſt one hundred feet above the level of the ſea; and the place itſelf, though built on a plain, has the ſame height above the water.

This huge precipice conſiſts of beds of white quartzoſe free-ſtone, croſſed at intervals with ſmall horizontal layers of black argillaceous ſchiſtus, ſoft, a little ſhining, and deriving its colour from impalpable particles of pit-coal.

In the part where the free-ſtone comes in contact with the ſchiſtus, the firſt is always divided

divided into ſmall ſtrata which eaſily ſeparate, and are themſelves ſomewhat tinged with coaly particles. There alſo may be diſtinguiſhed ſome ſmall bits of wood converted into coal.

To theſe alternate beds of free-ſtone, coloured with coal, and of black argillaceous ſchiſtus, ſucceed thick banks of white free-ſtone, interrupted in their turn with thin layers of black ſchiſtus and coloured free-ſtone; but here the coaly particles are more copious.

In ſhort, under the deepeſt beds of free-ſtone in the part where the ſea has uncovered them, are ſeen ſtrata of coal almoſt pure and fit for burning.

Induſtry is here in ſuch a ſtate of ſtagnation that no perſon has attempted, by following theſe remarkable indications, to ſink a pit, or even ſo much as to ſound for a mine of coals which preſents itſelf under ſuch favourable appearances, and which from its ſituation on the very edge of the ſea, would form a ſource of riches to the country.

I expreſſed my aſtoniſhment on the ſubject to ſeveral intelligent perſons, who framed excuſes for this negligence, by ſaying, that three or four miles inland there were ſome mines

of

of coal worked, which were ſufficient for the ſupply of the country.

The ſea, notwithſtanding the barriers oppoſed to it by the bold bank of free-ſtone on which St. Andrews is built, has gained upon the land ſo perceptibly, that, as I was aſſured on the ſtrongeſt authority, within leſs than two hundred and fifty years, it had undermined and worn the rock with ſuch activity as to deſtroy almoſt the whole of the ſcite of the ancient archiepiſcopal caſtle. A road which led from the caſtle to a mole ſtill exiſting is entirely carried away, ſo that the water completely intercepts the paſſage in a direct line; and it ſhould be remarked, that the ſpace deſtroyed between the caſtle and the head of the mole is about five hundred toiſes. Thus has the ſea in ſo ſhort a period waſted away a very conſiderable extent and thickneſs of ſolid rock; and at low water nothing is to be ſeen but rubbiſh and ruins.

From this encroachment, however, we are not to form general concluſions reſpecting the advancing or receding of the waters of the ocean. It is a circumſtance purely local that has occaſioned this accidental invaſion, which

I regard

I regard as completely unconnected with any general theory.

By an attentive examination of the ſpot, I diſcovered ſome of the cauſes of this great degradation.

And firſt, the facility which there has always been of drawing large maſſes of free-ſtone from this craggy tract on the reflux of the tide, is one cauſe, which we will not be apt to reject, if we conſider that the immenſe quantity of materials employed in conſtructing the cathedral, ſeveral large churches and convents, the caſtle and the houſes of the city, has been taken out of this place. I myſelf ſaw a great number of workmen employed in cutting out pretty large ſtones for ſome repairs which were making on the mole.

On the other hand, the poſition of the beds, the various ſubſtances of which they are compoſed, and their unequal degrees of hardneſs, tend to accelerate their degradation. The coaſt is ſo ſteep that the deep excavation which extends from the caſtle to the mole-head, bears the name of *the Precipice.*

The maſſes of free-ſtone being placed on beds of argillaceous ſchiſtus, which is ſoft,

pyritous and ſuſceptible of being diſſolved by water, are liable to ſlide from their place and to loſe their balance. The upper beds give a violent concuſſion to the others in their fall; and this permant cauſe of deſtruction, joined to the action of froſt, the atmoſphere, and the changes of wet and dryneſs, muſt at length occaſion extenſive havock. But what is very remarkable and worthy of attention, is, that all theſe fragments, which are ſubject to the powerful action of the waves and currents of the ſea, being daſhed againſt each other or rolled upon the hard and rugged bottom, are ſoon reduced to powder; thence there reſult conſiderable depoſites of ſand which the ſea throws up in banks on the beach, and which the winds form into ſmall hills. Thus the waves which tear aſunder the free-ſtone and carry it off the coaſt in huge ſolid pieces, throw it back on a neighbouring part in the form of ſand, which may in time acquire conſiſtence and form good ſoil.

It is eaſy to perceive the identity of this ſand, which is intermixed with ſome coal and clayey matter, with the free-ſtone, whence it originated. This newly formed tract of ſand occupies a ſpace of four miles long, and half a mile

a mile broad *. Such is probably the origin of the greater part of ſands, which may in a courſe of time, and with the aid of certain circumſtances, be a ſecond time formed into free-ſtone.

I ought to have ſtated, before diſmiſſing the ſubject of *the Precipice*, that the inferior ſtrata, which ſupport a maſs more than eighty feet thick of ſchiſtus and free-ſtone, are themſelves very remarkable, being compoſed of very hard free-ſtone, and containing pebbles of different forms and ſizes, and of a reddiſh colour in their cruſt or exterior ſurface. On breaking theſe pebbles, they are eaſily diſcovered to conſiſt of black baſaltic lava, ſtill retaining their magnetic quality, though their cruſt has undergone alteration.

As the rounded lavas thus confined are ſeen in great number in the lower beds of free-ſtone, and as it is probable that thoſe which have been invaded by the ſea contained ſimilar ones, it is beyond doubt that theſe pebbles exiſted prior to the formation of the

* In theſe ſands are found ſeveral living ſhell-fiſh. The large razor fiſh or *ſollen*, the *cardium ſenatum* of Linnæus, or *bucarde dentè* of Bruguiere, deſcribed in his article on the Natural Hiſtory of Worms, page 227, of the French Encyclopedia, and the *cardium ciliare* of Linnæus, or *bucarde frange* of Bruguiere, page 218 of the ſame book, are very common.

free-ſtone; that is to ſay, that they are the products of volcanos, and that they have been rounded by the ſea before the ſandy ſubſtances became united and conſolidated into a maſs of free-ſtone.

There is no room for any doubt or heſitation reſpecting the quality of the ſubſtances. The baſaltic pebbles are ſo many traces of diſcovery and uſeful indications to thoſe who endeavour to peruſe the grand volume of nature. But this is not a fit place to expatiate further upon the ſubject. I ſhall only ſay, that if accidental circumſtances of this kind cannot determine to a very nigh degree the time which has elapſed ſince the formation of theſe lavas and the free-ſtone, in which they are incloſed, they induce us at leaſt to believe that both the one and the other muſt have taken place at a very remote epoch.

CHAPTER XIII.

Departure from St. Andrews.—Largo.—Leven.—Dyſart—Kirkaldy.—Kinghorn.—Leith.—Return to Edinburgh.

SCARCELY had we left St. Andrews and entered on the road to Largo, when we found the fields ſcattered over with very large blocks of baſaltes. The farmers have incloſed their lands with them, and thus afforded to naturaliſts an eaſy opportunity of examining them.

They are of a fine black colour, great hardneſs, and a pure and homogeneous ſubſtance. I attentively examined a great number of the ſtones which were but recently broken, to try whether any extraneous body had entered into their internal compoſition. But I found their texture in general very pure, and found in a ſingle lump only a few ſmall cryſtals of black ſchorl. The ſchorls are in general very rarely met with in the volcanic products of Scotland and the Hebrides.

After a ride of three miles, we reached a pretty high flat, entirely covered with blocks

of baſaltes, which ſeemed to have been ſcattered about at random, and which very much incommode cultivation, as it would not be an eaſy matter to diſplace them. This elevated plain is of vaſt extent, and yields oats and rye; though the vegetable mould cannot be much more than five or ſix inches in depth.

This cultivated ſoil repoſes on blackiſh argillaceous ſchiſtus, diſpoſed in ſtrata. Banks of free-ſtone, like thoſe of St. Andrews, ſucceed the ſchiſtus, and then follow at a conſiderable depth beds of excellent coal. The number of pits which are ſeen along the road, announce that the collieries are worked with great activity. I counted more than fifteen coal-pits within the ſpace of a mile.

Largo is only a ſmall village; we ſtopped at it to bait our horſes. Banks of free-ſtone of great thickneſs are expoſed to view on all ſides; they are over-topped with enormous pieces of baſaltes. I had not before ſeen in the volcanic parts of Scotland, detached maſſes of baſaltes of ſo great a bulk. This compact lava is very pure and ſound, ſo that it may be formed into ſlabs or even ſtatues.

Leven and Dyſart are pretty large villages, which lie on the road by the ſea-ſide. In their

their environs are ſeveral collieries, which employ a great number of perſons. They are carried on upon a greater ſcale than thoſe in the neighbourhood of St. Andrews, and conducted with greater intelligence and more extenſive means. Thoſe of the inhabitants who are not employed in the collieries apply themſelves to fiſhing, in which they are very ſkilful.

Kirkaldy is a conſiderable burgh. The whole of its environs is ſtrewed with blocks of baſaltes; and this ſcattered train of lavas extends from Largo to beyond Kirkaldy, along a ſpace of more than twenty-four miles in length, and eight miles in breadth. What terrible convulſion was it that tranſported theſe baſaltes, and thus rolled and diſperſed them over ſo vaſt a ſurface?

I had already ſeen in Vivarais, a ſtate of things in every reſpect ſimilar; but upon a plain much higher above the coaſt of Maire. The maſſes of baſaltes are there equally large and not leſs numerous. They may be traced to the ſmall town of Pradelle, through an extent of more than twenty miles long, and four or five miles broad. This reſemblance ought not to eſcape conſideration.

From Kirkaldy we purſued our road to Kinghorn, a burgh ſituated on the water's edge. The blocks of baſaltes ſeemed to multiply as we approached the vicinity of Kinghorn; but very near the town we found the baſaltes in imbodied maſſes, that is, diſpoſed in large currents as it was diſcharged by the volcanos.

Between Kirkaldy and Kinghorn, and at a little diſtance from the road, are three upright rude ſtones, which have been erected as a memorial of ſome event, which it is now impoſſible to trace. Theſe monuments conſiſt of a rough-grained yellowiſh free-ſtone. The higheſt is about fifteen feet above ground, and muſt have ſunk at leaſt five feet below the ſurface; it is of conſiderable thickneſs: the other two are not ſo large. They appear to be of very high antiquity. Have they been erected by the Romans? This is not very probable; for, that warlike people, at the time they over-ran England and attempted to ſubjugate the Caledonians, who gave them the moſt vigorous reſiſtance, were too familiar with the arts, to raiſe ſuch ruſtic monuments which have no inſcription, nor any mark of workmanſhip. It is not improbable

Designed by St. Fond

I. King. Sculp.t

probable that theſe rude columns were conſecrated to the ſuperſtition of the ancient Druids, or that they were erected by a warlike people little ſkilled in the arts, in remembrance of ſome important events which have not deſcended to our knowledge.

Monuments of this kind are very numerous in Scotland and the Hebrides. The natives entertain various and doubtful opinions upon the ſubject. Some call them the altars, temples, or monuments of the Druids; while others, regarding them as of greater antiquity, ſay, that they were erected in the time of Fingal; that is, at an epoch indeterminate, and perhaps fabulous; and another claſs maintain that they are Roman tombs, and contain the aſhes of illuſtrious warriors, who fell in their combats with the Caledonians. I ſhall leave the developement of this enigma to the Edinburgh Antiquarian Society, with merely calling to their recollection that ſimilar monuments are found in Lower Brittany, and that the language of its inhabitants has a ſtrong reſemblance to that of the Hebridians, and I entertain the hope that they will throw ſome light

light upon a ſubject ſo worthy of being inveſtigated.

There are twenty-ſeven miles from St. Andrews to Kinghorn. We were obliged to uſe the ſame horſes for the whole way; there being no place where we could change them. Kinghorn is ſituated on the edge of the ſea; and at this place is the ferry for croſſing the Frith of Forth to Leith, which is within a very ſhort diſtance of Edinburgh.

The beach of Kinghorn, and, indeed, of the whole coaſt, is bordered with layers of lava; ſome of them in the form of baſaltes, in an extended maſs, or in priſms, and others in a gravelly and decompoſed ſtate. Theſe ſeveral ſtreams of volcanic matter repoſe immediately on an argillaceous ſchiſtus under which are frequently found beds of coals.

In the lavas of Kinghorn I found ſome zeolite, and a great deal of calcareous ſpar, adhering to decompoſed lavas.

The paſſage from Kinghorn to the port of Leith is ſeven miles. We performed it in two hours, in one of the ferry-boats, which are tolerably commodious, and ſet out regularly at certain hours. In the middle of the Frith

Frith is a very rapid current, which is obſervable at all times; for, where it runs, the ſea is always agitated during the greateſt calms.

The harbour of Leith, at the time we entered it, was filled with veſſels, Engliſh, Scotch, American, &c. I ſaw ſeveral veſſels belonging to Glaſgow and Leith, which were done over with bitumen or tar, extracted from pit-coal at the manufactures of Lord Dundonald, who has introduced the making and uſing of this tar on a great ſcale in that country. The veſſels coated with it appeared of a fine ſhining black, which diſtinguiſhed them from the others. Several ſhip-maſters whom I ſpoke to on the ſubject, and ſome of whom had come from the Weſt Indies, aſſured me that their veſſels which had been covered with this tar, arrived in the beſt poſſible condition, and were completely free from worm-holes. Navigation is doubtleſs much indebted to Lord Dundonald, who perſevered with the moſt undeviating conſtancy, in bringing to perfection this uſeful product of coal, and alſo in bringing it into general uſe, a thing not eaſily effected upon every occaſion when it is neceſſary to change ancient cuſtoms.

We reached the harbour of Leith about ſix in the afternoon of the 16th of October. William Thornton, who proceeded directly forward from Perth, without accompanying us to St. Andrews, waited for us at Edinburgh. We went from Leith to Edinburgh in leſs than half an hour, along a ſuperb road.

Thornton had procured us lodgings at a private houſe, and at a reaſonable rate; for we had determined not to go to Dun's Hotel, where ſuch exactions had been practiſed on us during our firſt ſtay in that city. Our new lodgings, for ourſelves and our three domeſtics, coſt only eighty-four livres a week.

As we intended to ſpend a fortnight at Edinburgh, we made an arrangement with the maſter of a tavern who ſerved us with proviſions, dreſſed in the French ſtile, adding a few Scotch diſhes, which were agreeable to us. This man is a native of Bourdeaux, and was brought from France by a Scotch Lord, with whom he reſided a long time. He afterwards married and ſettled in Edinburgh. He is a very good landlord and full of attention and complaiſance. I would recommend his houſe to ſuch naturaliſts and

others

others as intend to viſit Edinburgh. They have only to aſk for the maſter of the French tavern, which is very well known.

At this table, we formed an acquaintance with Baron Hartfield, whoſe ordinary reſidence is at Berlin. He is a man of eſtimation and talent, and travelled for the purpoſes of information. He had puſhed his reſearches as far as the Hebrides, and viſited the iſle of Staffa; in his paſſage to which, he told us, he encountered the moſt imminent danger.

CHAPTER XIV.

Edinburgh.—The Univerſity.—Learned Societies.—College of Phyſicians.—College of Surgeons.—Cabinet of Natural Hiſtory.—Robertſon.—Smith.—Black.—Cullen, &c.

EDINBURGH is ſituated in 55° 57′ of north latitude, and 3° 14′ of weſt longitude, from the meridian of Greenwich. The diſtance of this city from London is, by the eaſt road, through Berwick, 388 miles; by the middle road, through Wooler, 378 miles; and by the weſt road, through Carliſle, 396 miles.

The ſciences, literature, natural hiſtory, and the arts, being the principal objects of my journey; what I ſhall have to ſay of Edinburgh will chiefly relate to them: topographical deſcriptions of this city are to be found in a number of other works.

THE UNIVERSITY.

The following is the eſtabliſhment of the Univerſity of Edinburgh, with the names of thoſe who were at this time its profeſſors.

The

The King, is the Protector;
Doctor Robertson, Principal;
Robert Hamilton and A. Hunter, professors of Theology;
Robert Cumming, Church History;
Doctor J. Robertson, Hebrew;
A. Dalziel, Greek;
D. Stewart, Mathematics;
A. Fergusson, Moral Philosophy;
J. Robison, Natural Philosophy;
A. Tytler and J. Pringle, Civil History;
William Wallace, Scottish Law;
Robert Dick, Civil Law;
A. M'Conochie, the Law of Nature and Nations;
Hugh Blair, Rhetoric;
John Hope, Botany;
Francis Home, Materia Medica;
William Cullen, Practice of Medicine;
James Gregory, Theory of Medicine;
Joseph Black, Chymistry;
Alexander Monro, Anatomy;
Alexander Hamilton, Midwifery;
John Walker, Natural History.

ROYAL SOCIETY.

The Duke of Buccleugh is President of the Royal Society;
Henry Dundas, Vice-President.

The

The Preſidents of the Phyſical and Literary Claſſes, &c. are

Baron Gordon;
Lord Elliock;
General H. Campbel;
Adam Smith;
John M'Laurin;
Doctor Adam Fergusſon;
Doctor Monro;
Doctor Hope;
Doctor Black;
Doctor Hutton;
Profeſſor Dugald Stewart;
John Playfair;
Profeſſor J. Robertſon, Secretary.

ANTIQUARIAN SOCIETY—COLLEGE OF PHYSICIANS—COLLEGE OF SURGEONS—MEDICAL SOCIETY.

There is a ſociety lately eſtabliſhed in this city for the purpoſe of collecting and preſerving every thing that relates to Scottiſh antiquities. The Earl of Bute is the Preſident, the Earl of Buchan is Firſt Vice-Preſident, and Lord Gardenſtone is Second Vice-Preſident.

There

There are beſides a college of phyſicians, a college of ſurgeons, and a medical ſociety.

There is alſo a popular eſtabliſhment called the *High School of the City*, which announces that here nothing connected with public inſtruction is neglected. This ſchool is divided into ſeveral claſſes, the maſters of which are employed in teaching the elements of the Latin language to youth.

Theſe inſtitutions ſhew that the arts, the ſciences, and the Belles-lettres are cultivated and eſteemed in this city, which is honoured by the diſtinguiſhed characters it has produced in every branch of learning. The celebrity of the profeſſors is ſo great that vaſt numbers of foreigners come from every quarter of the world to ſtudy at the univerſity, and the money they ſpend is a conſiderable advantage to the town.

Edinburgh, both from its ſituation and its tranquillity, is a proper place for the ſciences. It is not diſturbed by the tumult of parliamentary diſcuſſions, the buſtle of an overgrown commerce, nor the diſtracting amuſements of London. From time immemorial the muſes have choſen to reſide on the top of a hill near a ſolitary fountain.

Mentioning the muſes, brings to my recollection an inſcription in their honour, which is placed above one of the gates of the univerſity. It is rather extraordinary:

MUSIS ET CHRISTO.

TO THE MUSES AND CHRIST.

This aſſociation may to ſome appear profane, but it is only a little conceit by which the author probably intended to announce that both letters and religion are taught in this building. A miniſter of the preſbyterian religion, who accompanied me on my viſit to the univerſity, was very eager to juſtify this ſingular inſcription, which he thought remarkably ingenious: He aſked my opinion of it.

I replied to him with a ſmile, that I believed the inſcription might be interpreted in a very favourable manner, if the meaning which I was inclined to give it, were adopted.

It is proper, ſaid I, that the muſes ſhould preſide over an eſtabliſhment which elevates man to the true dignity of his nature by inſtructing him. They may be here conſidered

as

as ſupplicating reaſon to proſcribe the two chairs of *Theology* and *Church Hiſtory*; and of thoſe of *Logic*, *Moral Philoſophy*, *Natural Philoſophy*, *the Laws of Nature and Nations*, *Civil Law*, and *Scotch Law*, to make only one, which may be called the Profeſſorſhip of the *Laws of Nature and Nations*.

On the other hand, the greateſt of moraliſts, placed by the ſide of the muſes, ought to remind the inhabitants of theſe countries that true knowledge is the enemy of fanaticiſm and intolerance; that thoſe who have ſhed ſo much of the blood of Scotland in theological diſputes, were ſtrangers to morality as well as to the ſpirit of humanity, which belongs to the religion they pretended to profeſs *; and that thoſe who overthrew and deſtroyed the ancient monuments of the nation, becauſe they were connected with a religion which they did not approve, were real barbarians, whoſe ferocity was only equalled by their ignorance.

* Such as Knox, who entitled an account of the aſſaſſination of Cardinal Beaton, "The Joyous Narration, "&c." Such as that ſanguinary prieſt, Beaton himſelf, who burnt human beings alive, becauſe they were what he called heretics.

CABINET OF NATURAL HISTORY.

The cabinet of natural hiſtory, in the univerſity, is under the direction of Doctor Howard. The examination of this collection gave me great pleaſure, and intereſted me much more than that of the Britiſh Muſeum, in London, though it was far leſs conſiderable; but, the objects which compoſe it, are in a more methodical order, particularly the ſtones and minerals: Beſides, the managers of this muſeum have very properly taken care to collect all the productions of Scotland they have been able to procure.

Thus this muſeum is as inſtructive and intereſting to the natives of Scotland, as it is agreeable to foreigners, who are always much more deſirous of ſeeing collections of the natural and local riches of a country, than the multitude of diſconnected and inconſequential objects conſtantly brought from India, and which are repeated over and over in every cabinet.

Some reforms are, however, wanting to the muſeum of the univerſity. The place allotted for it ought to be larger and decorated

rated with more taſte. The claſſification ſhould alſo be extended to the other parts as well as the minerals. Theſe improvements will certainly one day take place; that they have not been made already can only be aſcribed to the remaining influence of that erroneous mode of education which in all ancient univerſities has occaſioned natural ſcience to be too much neglected. It is only lately that a profeſſorſhip in this important branch of inſtruction was eſtabliſhed in the college of Edinburgh; but as a taſte for this delightful ſtudy will, doubtleſs, increaſe very rapidly in a city where the other ſciences have ſo long fixed their reſidence, it is to be hoped that this cabinet will ſoon be placed in a building more worthy of a nation which is capable of furniſhing it with the richeſt ſpecimens. I therefore invite Doctor Howard, who poſſeſſes much knowledge, and who loves his country, to ſolicit from the government the grant of a building ſuitable to the collection he ſuperintends, with grounds ſufficiently extenſive to join the botanical garden to the cabinet of natural hiſtory.

Lithology, and the ſtudy of minerals, have as yet made little progreſs in Scotland. There

are therefore few collections of these objects. Doctor James Hutton is, perhaps, the only individual in Edinburgh who has placed in his cabinet some minerals and a number of agates chiefly found in Scotland; but I observed, that he had not been sufficiently careful in collecting the different matrices which contained them. I therefore experienced much more pleasure in conversing with this modest philosopher than in examining his collection, which presented me with nothing new, since I had seen and studied upon a large scale and in the places where nature had deposited them, almost all the specimens of his collection.

Doctor Hutton was at this time busily employed in writing a work on the theory of the earth *.

* This work, which contains rather general views of the subject than a body of observations, appeared in 1785, in the translations of the Royal Society of Edinburgh, for that year, under the following title: "Theory of the Earth, "or an Investigation of the Laws observable in the com- "position, dissolution, and restoration of land upon the "globe, by James Hutton, M.D. F.R.S.E. and Member "of the Royal Academy of Agriculture at Paris *."

* This work has since been considerably enlarged; in 1795, it was published in 2 vols. 8vo. under this title, *Theory of the Earth, with Proofs and Illustrations, in four parts.*—Translator.

During

During my reſidence at Edinburgh I viſited, as often as poſſible, the celebrated chymiſt, Dr. Black, who in 1761 gave the firſt analyſis of calcareous earth, in which he demonſtrated the exiſtence of the aerial acid, commonly called fixed air. This illuſtrious philoſopher honoured me with the moſt polite and kind attention.

After dining with him one day he ſhewed me two pieces of petrified, or more properly, *quartzified* wood; for, upon examining them with a microſcope, it appeared that the quartzoſe juice had penetrated through all their parts, and given them ſuch a degree of hardneſs that they ſtruck fire with ſteel. This wood had been ſent to Doctor Black from Ireland. Their colour was brown, and nearly the ſame as that of the wood of Mahalep when it is worked.

This wood penetrated by quartz in the manner I have deſcribed, poſſeſſes the following ſingular property: If ſmall fragments are broken off with a hammer and thrown on a piece of burning coal, in about a minute an agreeable ſmell is perceived reſembling that which proceeds from the wood of aloes.

It is doubtleſs aſtoniſhing that the eſſential odoriferous oil of this wood ſhould have been preſerved during the long time neceſſary for transforming the wood into a ſtate of quartzoſe petrifaction; but ſuppoſing that ſome particular circumſtances had accelerated the petrification, it is ſtill very extraordinary that this wood, which bears all the marks of a vegetable foreign to theſe countries, ſhould be found on the banks of Lough Neigh in Ireland.

Doctor Black was pleaſed to give me the two ſpecimens he had of this curious wood, informing me at the ſame time, that he did not collect objects of this kind, and that he ſhould be very happy if I would place them in my cabinet.

This learned chymiſt alſo ſhewed me the mechaniſm of a portable furnace of his own invention, which will prove of great utility in the arts, and in chymiſtry. It is ſo contrived that the heat may not only be gradually increaſed at pleaſure, but carried to ſuch a high degree as to reduce iron nails to a ſtate of fuſion. This plan may be extended and perhaps even applied to high furnaces in which iron ore is ſmelted.

I ſhall

I ſhall deſcribe the manner in which the interior of this furnace is formed: for in it the merit of the invention chiefly conſiſts. It is made of thick iron plates, and differs very little in its ſtructure from the ordinary ſtove. Its form is cylindrical, and a cover is fitted to the top, which is occaſionally taken off to ſupply the ſtove with fuel.

The mode by which the air enters is through holes of different ſizes formed in a ring which turns round, ſo as to give facility to the admiſſion of the air in the quantity wanted: but I repeat it, the conſtruction is not the great merit of the invention, for I have ſeen, both in France and Germany, many furnaces, the mechaniſm of which is nearly the ſame with this, as well with reſpect to the mode of graduating the admiſſion of the air as that of raiſing the heat to the degree required.

It is the manner in which the interior is covered, and the ſubſtances uſed for fuel that do honour to the profound knowledge of Doctor Black.

A quantity of the beſt charcoal is reduced to a fine powder, and paſſed through a ſieve; ſome fine clay is alſo reduced to powder: the colour

colour of the latter is of no importance; the leaſt fuſible and the moſt refractible, is the beſt.

The clay is ſoaked in water in a tray, in the proportion of a quart to three quarts of charcoal duſt. This mixture is well kneaded and amalgamated, and the paſte which is formed, is left in a ſtate of moiſture. If the clay be very glutinous, the proportion of charcoal is encreaſed. The inſide of the furnace is then plaſtered over with a quantity of this compoſition ſufficient to form a thin bed, which is ſmoothed with the hand and rendered every where as equal as poſſible. This firſt plaſter is made about a line thick, and allowed to dry ſlowly, without the operation of fire, that it may not be expoſed to the danger of cracking. When this firſt plaſter has acquired a ſufficient degree of hardneſs, a ſecond bed is formed; which being allowed to dry, a third is laid over it in the ſame manner. Thus different beds are formed in ſucceſſion above each other until the plaſter has acquired the thickneſs of about an inch.

Great attention muſt be paid to drying the beds ſlowly and forming them into one body, to which the fire will afterwards give great conſiſtence.

It

It is well known to experimental philoſophers and chymiſts, that charcoal is one of the worſt conductors of heat. Founders, blackſmiths, and other workmen, have long been acquainted with this fact, tranſmitted from father to ſon, and have uſed charcoal duſt to great advantage in many of their operations without thinking of the manner in which it acted. The uſeful effects it produces are, however, reſult leſs from its combuſtible quality than that of its being a bad conductor of heat; or rather that it retains the heat, concentrates it, and prevents it from eſcaping and loſing itſelf on the ſurrounding points.

I have been induced to enter into theſe details, becauſe I am of opinion that what has been ſaid will not prove inuſeful to the arts, and that thoſe who love and cultivate this particular branch of economy, may make ſucceſsful applications of Doctor Black's invention. Theſe motives will excuſe the length of this article.

I was ſeveral times in company with Doctor John Aiken, a private profeſſor of Anatomy, in Edinburgh. He ſhewed me a number of ingenious machines of his invention;

tion; and, among others, one for facilitating difficult births, the uſe of which was not at all dangerous, and in the invention of which he had followed nature as cloſely as poſſible.

This inſtrument may be compared to a long ſlender hand. It is introduced quite open and without any kind of compreſſion into the womb of the mother. This artificial hand, which is covered with a fine ſoft ſkin, is placed againſt the child upon which it is made to collapſe to the degree of contraction wanted, by the means of a ſcrew in the handle, which acts with a gradual and gentle motion. The accoucheur then uſing his right hand, aided by this point of ſupport, may deliver a woman in difficult labour with much more facility than in any other manner. Doctor Aikin aſſured me, that he had experienced the greateſt ſucceſs in the uſe of this inſtrument.

The knowledge of whatever may contribute to relieve ſuffering humanity, ought to be as widely diffuſed as poſſible. I therefore begged Doctor Aiken to allow me to take a model of this inſtrument to France. He readily conſented, and procured an excellent workman, who in a few days executed an

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inſtrument perfectly ſimilar. I packed it up with the intention of bringing it to Paris, and ſubmitting it to the examination of our moſt celebrated practitioners in midwifery.

Doctor Aiken alſo ſhewed me a lock which he had contrived for great guns, by which they might be eaſily made to perform a double diſcharge; but while I admired his inventive genius, I could not avoid telling him, that I was far better pleaſed to ſee ſo ſkilful a phyſician employed in healing than in deſtroying, and that I loved his invention for bringing men into the world, much more than I did that for ſending them out of it.

Some days after, I had the pleaſure of dining with Doctor Cullen, who, perhaps, is the oldeſt, and certainly is one of the moſt celebrated phyſicians of Europe. The ſcience of medicine owes him great obligations, and the city of Edinburgh ought never to forget that his reputation has attracted within its walls a multitude of foreigners who come from all quarters of the world to receive inſtruction in that learned ſchool, in the creation of which he has had a principal ſhare.

Doctor

Doctor Cullen lived in the midſt of a numerous family, who formed around him an amiable circle of friends. Good nature and amenity reigned in his houſe. This learned phyſician merited all theſe advantages, for he poſſeſſed himſelf manners and a diſpoſition of the moſt agreeable kind. I found that he very much reſembled Bouffon in his behaviour and mode of living, which rendered him doubly intereſting to me. His table was plentifully ſerved, but without any luxury. I was however aſtoniſhed to find a profuſion of punch brought in between the deſert and tea.

This regimen, in the houſe of a phyſician of ſuch great reputation, appeared to me very extraordinary. He obſerved my ſurpriſe, and ſaid to me with a ſmile, that this beverage was not only ſuited to his age, but that a long experience had convinced him that when taken with moderation it was very ſalutary for the inhabitants of Scotland, particularly during the latter part of the autumnal ſeaſon, and in winter, becauſe the cold humidity which then prevails in this climate often checks perſpiration. *Punch*, he remarked, *is a warm ſtimulant, which operates wonderfully in main-*

maintaining that neceſſary ſecretion, or in reſtoring it to its equilibrium.

This humid and penetrating atmoſphere had, for ſome time, affected me in a very diſagreeable manner notwithſtanding the active life which I led. I am perſuaded, that it is one of the cauſes of that ſombre melancholy to which the people of England are ſo frequently liable. In vain I took exerciſe, and endeavoured to employ my time in a manner perfectly ſuitable to my taſte; I found that the miſts, the frequent rains, the daily winds, paſſing ſuddenly from heat to cold, a ſharpneſs in the air, which cannot be ſo eaſily deſcribed as it is felt; the abſence of the ſun, which fogs or clouds almoſt conſtantly eclipſe at this ſeaſon, plunged me into an involuntary melancholy, which I ſhould not have been able to ſupport long.

To raiſe my ſpirits, my friends often informed me that the ſun was about to appear; but in my bad humour, I was more than once tempted to reply to them, as Caraccioli, the viceroy of Sicily did to an Engliſh nobleman, who deſired him to look at that luminary in London: "Your Engliſh ſun, my lord, "very much reſembles our Sicilian moon."

This

This diſagreeable feeling was not to be endured, and I reſolved to adopt the regimen of Doctor Cullen. Each day after dinner I took a glaſs of punch, compoſed of rum, ſugar, lemon juice, a little nutmeg and boiling water, which ſoon reſtored me to my uſual condition *.

I ſaw ſeveral other men diſtinguiſhed in various branches of literature, among whom were Doctor Anderſon, Sir John Dalrymple, and the celebrated hiſtorian Doctor William Robertſon, with whom I enjoyed many agreeable converſations.

That venerable philoſopher, Adam Smith, was one of thoſe whom I viſited moſt frequently. He received me on every occaſion in the kindeſt manner, and ſtudied to procure for me every information and amuſement that Edinburgh could afford.

Smith had travelled in France, and reſided for ſome time in Paris. His collection of books was numerous and excellently choſen: The beſt French authors occupied a diſtin-

* That excellent phyſician, Doctor Cullen, is no more. He was regretted by his friends, and mourned by the city of Edinburgh which erected a funeral monument to his memory: He was worthy of that honour, and that city was worthy of him.

guiſhed

guiſhed place in his library, for he was very fond of our language.

Though advanced in years he ſtill poſſeſſed a fine figure. The animation of his countenance was ſtriking, when he ſpoke of Voltaire, whom he had known and whoſe memory he revered, "Reaſon," ſaid he, one day, as he ſhewed me a fine buſt of this author, "owes him incalculable obligations; "the ridicule and the ſarcaſms which he ſo "plentifully beſtowed upon fanatics and "hypocrites of all ſects, have enabled the "underſtandings of men to bear the light of "truth, and prepared them for thoſe enquiries "to which every intelligent mind ought to "aſpire. He has done much more for the "benefit of mankind than thoſe grave philo-"ſophers whoſe books are read by a few "only; the writings of Voltaire are made "for all and read by all."

On another occaſion he obſerved to me, "I cannot pardon the emperor Joſeph II. "who pretended to travel as a philoſpher, "for paſſing Ferney without paying homage "to the hiſtorian of the Czar Peter I. From "this circumſtance I concluded that Joſeph "was but a man of inferior mind."

One evening while I was at tea with him he ſpoke of Rouſſeau with a kind of religious reſpect, "Voltaire ſought to correct the vices "and the follies of mankind by laughing at "them, and ſometimes by treating them "with ſeverity; Rouſſeau conducts the rea-"der to reaſon and truth, by the attraction "of ſentiment, and the force of conviction. "His *ſocial compact* will one day avenge all "the perſecutions he experienced."

He aſked me one day, whether I loved muſic? I anſwered, that it formed one of my chief delights whenever I was ſo fortunate as to hear it well executed. "I am very glad of it," ſaid he, "I ſhall put you to a proof which will "be very intereſting for me; for I ſhall take "you to hear a kind of muſic of which it is "impoſſible you can have formed any idea, "and it will afford me great pleaſure to know "the impreſſion it makes upon you."

Next morning at nine o'clock, Smith came to my lodgings. At ten he conducted me to a ſpacious concert-room, plainly but neatly decorated, in which I found a numerous audience. I ſaw, however, neither orcheſtra, muſicians, nor inſtruments. A large ſpace was left void in the middle of the room, and

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ſurrounded with benches which were occupied by gentlemen only. Ladies and gentlemen were diſperſed over the room upon other ſeats. Adam Smith informed me, that the gentlemen who ſat in the middle were the judges of the muſical competition which was about to take place; they were almoſt all, he obſerved, inhabitants of the iſles or highlands of Scotland and might therefore be regarded as the natural judges of the conteſt. They were to decree a prize to him who ſhould beſt execute a favourite piece of Highland Muſic. The ſame air was therefore to be played by all the competitors.

In about half an hour, a folding door opened at the bottom of the room, and to my great ſurpriſe, I ſaw a Highlander advance, playing upon the bagpipe. He was dreſſed in the ancient Roman habit of his country. He walked up and down the empty ſpace with rapid ſteps and a martial air, blowing his noiſy inſtrument, the diſcordant ſounds of which were ſufficient to rend the ear. The tune was a kind of ſonata, divided into three parts. Smith requeſted me to pay my whole attention to the muſic, and to explain to him afterwards the impreſſion it made upon me.

But I confeſs that at firſt I could not diſtinguiſh either air or deſign in the muſic. I was only ſtruck with the piper marching continually backward and forward with great rapidity, and ſtill preſenting the ſame warlike countenance. He made incredible efforts with his body and his fingers to bring into play the different reeds of his inſtrument, which emitted ſounds that were to me almoſt inſupportable.

He received however great applauſe. A ſecond muſician ſucceeded, who was alſo left alone in the intermediate area, which he traverſed with the ſame rapidity as the former. His countenance was no leſs dignified and martial than that of his predeceſſor. He appeared to excel the firſt competitor; and clapping of hands and cries of *bravo* reſounded on every ſide. During the third part of the air I obſerved that tears flowed from the eyes of a number of the audience.

Having liſtened with much attention to eight pipers in ſucceſſion, I at laſt began to diſcover that the firſt part of the air was a warlike march: the ſecond ſeemed to deſcribe a ſanguinary action; the muſician endeavouring by a rapid ſucceſſion of loud and diſcordant

dant ſounds to repreſent the claſhing of arms, the ſhrieks of the wounded, and all the horrors of a field of battle. In this part, the performer appeared convulſed; his pantomimical geſtures reſembled thoſe of a man engaged in combat. His arms, his hands, his head, his legs, were all in motion. He called forth all the various ſounds of his inſtrument at the ſame moment, and this ſingular diſorder made a great impreſſion upon the company.

With a rapid tranſition the piper paſſed to the third part, which was in a kind of andante. His convulſive motions ſuddenly ceaſed. His countenance aſſumed an air of deep ſorrow. The ſounds of his inſtrument were plaintive, languid and melancholy. They were lamentations for the ſlain—the wailings of their friends who carried them from the field of battle. This was the part which drew tears from the eyes of the beautiful Scotch ladies.

The whole of this entertainment was ſo extraordinary, and the impreſſion which the ſounds of this wild inſtrument ſeemed to make upon the greater part of the audience was ſo very different from that which they made upon me, that I could not avoid conceiving that the lively emotions exhibited by the per-

ſons around me were not occaſioned by the muſical effect of the air itſelf, but by an aſſociation of ideas which connected the diſcordant ſounds of the bagpipe with ſome hiſtorical facts thus brought forcibly to the recollection of the audience *. There are ſcarcely any traces of a written language among the Highlanders, either in manuſcripts or upon their monuments; it may therefore be preſumed that they have had recourſe to ſongs to tranſmit to their poſterity the hiſtory of the events in which they were deeply intereſted. Accuſtomed to hear theſe airs from their infancy, and taught by their parents to connect them with tranſactions which are to them of the greateſt importance: they never hear them without being ſtrongly affected. It is not therefore aſtoniſhing that they are ſo paſſion-

* Johnſon makes the following obſervation on an air which he heard at the ſeat of Sir Alexander M'Donald in the iſle of Sky: "As we ſat at Sir Alexander's table, we "were entertained, according to the ancient uſage of the "North, with the melody of the bagpipe. Every thing in "thoſe countries has its hiſtory As the bagpiper was "playing, an elderly gentleman informed us, that in ſome "remote time, the M'Donalds of Glengary having been "injured, or offended by the inhabitants of Culloden, and "reſolving to have juſtice or vengeance, came to Cullo-"den on a Sunday, where finding their enemies at wor-"ſhip, they ſhut them up in the church, which they ſet on "fire; and this, ſaid he, is the tune which the piper "played while they were burning."

ately

ately fond of this kind of muſic. They have however another kind which is better adapted to the voice, and conſtructed more according to the rules of art, which they uſe in their dances, and their amorous and convivial ſongs: But they regard this muſic as inferior to the former.

The ſame air was played by each competitor, of whom there was a conſiderable number. There appeared to be no preference given but to talents, and the moſt diſintereſted applauſe was beſtowed on thoſe who excelled in their art. I confeſs I did not admire any of them. To me they were all equally diſagreeable. The muſic and the inſtrument conſtantly reminded me of a bear's dance.

The competition was followed by a lively and animated dance, formed by a part of the pipers while the others played ſuitable airs, which poſſeſſed expreſſion and character; but the union of ſo many bagpipes produced a moſt hideous noiſe.

The competitors afterwards formed themſelves into a line two deep, and marched in that order to the caſtle of Edinburgh, which is built upon a volcanic rock. There they

played an air, which was a kind of ballad, in honour of the unfortunate Mary Queen of Scots, for whom the Highlanders ſtill preſerve a warm attachment and religious reſpect. They ſpeak of her with a tender affection: They regard her as the innocent victim of the cruel and implacable jealouſy of Elizabeth. Mary was their Queen. They knew that ſhe was beautiful, mild, affable and generous; that ſhe loved the arts; that ſhe long languiſhed in a painful captivity; and that ſhe died with reſignation and courage. Leſs would be ſufficient to intereſt honeſt peaceable men, whom ſtate policy, and the crimes which it engenders, have not yet corrupted, and who abhor the ſhedding of blood in any way but for legitimate defence.

I do not know the antiquity of competitions of this kind. During my ſtay in Mull, I was informed that there had been beyond all time of memory a college or ſociety of bagpipers in that iſland. This ſchool was not entirely extinguiſhed in conſequence of the death of the famous Rankin, who had the direction of it for about thirty years. M'Rimmon kept a ſimilar ſchool in the iſle of Sky, and each of the principal families of

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the Hebrides always kept a piper, whoſe office was hereditary.

While I remained at Edinburgh I made ſeveral excurſions for the purpoſe of examining the natural hiſtory of the environs of that city, and I formed a large collection of volcanic ſubſtances, and other intereſting mineralogical ſpecimens. Each article was carefully ticketted, and Doctor Swediaur kindly took upon himſelf the charge of ſending them to France with the other collections I had made in the Hebrides.

This rich collection, the fruit of ſo much pain and ſo much pleaſure, was loſt, as well as the veſſel in which it was embarked, on the coaſt of Dunkirk. The crew with difficulty ſaved themſelves in a boat, and I was deprived in a moment of a treaſure to which I attached the greater value becauſe it contained a variety of new objects which would have been highly intereſting to naturaliſts.

Fortunately, whenever I had leiſure, I wrote exact deſcriptions of the ſpecimens I collected, which have enabled me to give a correct account of the lithology of Glaſgow, Perth, Staffa, the iſle of Mull, and other places. My various engagements at Edinburgh, however,

ever, did not leave me time to take deſcriptions of the whole of the ſpecimens I collected there. This is the only omiſſion of the kind I have to charge myſelf with; but unfortunately it prevents me from giving a complete account of the various and remarkable productions with which the hills that are grouped around that city abound, and which have almoſt all been a prey to the action of ſubterraneous fire.

I ſhould have been the more deſirous of giving a detailed account of theſe ſpecimens, which left no doubt as to the exiſtence of ancient volcanos, ſince I found the greater part of the learned men of this city obſtinately prejudiced againſt this opinion.

The caſtle, which commands the town, is built upon a hill formed of compact lava in the form of baſaltes. The black colour of this lava, and the gothic aſpect of the caſtle which ſurmounts this volcanic precipice, forms a ſtriking and very pleaſing contraſt with the elegant white houſes, built with great taſte in that part of the city which is called the New Town.

Not far from this there is another eminence called the Calton Hill, formed of greyiſh

greyiſh lava, near the top of which there ſtands a monument erected to the memory of a philoſopher and an hiſtorian—It contains the aſhes of David Hume.

Behind the town there is an elevated chain in a part of which the hills ſeem piled up one againſt the other, and are compoſed of baſaltic lava. This ſubſtance, which, at one time, muſt have been liquefied, exhibits priſmatic ſepta occaſioned by the cooling of the lava. There is here, however, none of that aſtoniſhing regularity diſplayed in the priſmatic columns of the cave of Fingal, or the Giants Cauſeway of Antrim. The rapid mode in which this lava probably cooled, may have prevented this beautiful effect from taking place, or perhaps that regularity is produced by cauſes of which we ſtill are ignorant.

One of the hills of this ridge, has a hollow in its ſummit, and in the whole of its form ſomewhat reſembles a chair or gigantic ſeat. This ſpot, in which there is nothing remarkable but its elevation and its ſteepneſs, is known in the Old Chronicles under the latin name of *Arthuri Sedes*,

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and in Engliſh by that of *Arthur's Seat.* It is poſſible, however, that this name may have its origin in ſome other cauſe than the figure of the top of the hill, the tradition of which is loſt.

Sibbald, in his *Scotia Illuſtrata*, printed in 1684, gives an account of a barometrical obſervation made by the mathematician, George Sinclair, on the ſummit and at the bottom of a mountain which he calls *Sedes Arthuri.* There is no doubt but it is the ſame as that of which I have been ſpeaking *.

I examined the large blocks of baſaltes which are detached from this mountain and lie ſcattered about at its baſe, in which I obſerved ſpots of zeolite even in the centre of the lava. I collected ſome very fine ſpecimens. This zeolite which is white, and

* Ex obſervatione Georgii Sinclari mathematici noſtratis, in vertice illius montis, cui nomen vulgo ARTHURI SEDES, ob id imprimis celebris, quod civitati Edinburgi, ob vicinitatem imminet, mercurialis cylindri altitudo reperta eſt 28, digitorum cum quadrante; apud radices autem montis 29. Sibbald, Scotia Illuſtrata, par I. lib. i. folio 10.

in

in ſome parts clouded with a blueiſh tinge, is neither radiated nor cryſtallized in a regular manner. It is rather of the ſcaly texture of white marble. It is hard and ſuſceptible of the moſt brilliant poliſh. This is not ſurpriſing, when it is conſidered that it contains a ſmall mixture of quartzoſe earth. This gives it ſomething of a calcedonious appearance; but it is fuſible with the blowpipe, bubbles in ſmelting, and has all the properties of zeolite.

Behind theſe volcanized mountains there are beds of quartzoſe free-ſtone, which has experienced in a very conſiderable degree the action of fire, and thereby acquired a reddiſh colour. Indeed, the operation of ſubterraneous fire is manifeſt every where around Edinburgh, where it exhibits the ſame characteriſtic traces as in the environs of Perth, Glaſgow, and Dunbarton, and in the iſland of Staffa.

I regret that I am obliged to confine myſelf to this general deſcription: If my valuable collection had not been loſt, I ſhould have deſcribed a ſeries of volcanic productions which would have removed every doubt on this ſubject, and demonſtrated

ſtrated that the vicinity of Edinburgh has been the prey of ancient volcanos, ſince it ſtill exhibits lavas ſimilar to thoſe of Etna and Veſuvius.

CHAP-

CHAPTER XV.

Departure from Edinburgh.—Itinerary to Manchester.—Natural History

AFTER taking leave of Doctors Black, Cullen, Smith, and the other respectable characters who had treated me with so much kindness in Edinburgh, I made preparations for my return to London; I determined to take the Carlisle road, which would give me an opportunity of seeing Manchester, Derby, Buxton, Castleton, Birmingham, &c.

When I left London with my fellow-travellers our party consisted of four persons, on returning from Edinburgh it was reduced to two.

I forgot to mention that M. de Mecies, after visiting the cave of Fingal, which was the principal object of his journey, left us at Mr. M'Lean's, in the isle of Mull, and set out for London, where business required his presence.

Our other interesting and agreeable fellow-traveller William Thornton, intending to

to paſs ſome months with his friends in America, determined to remain in Edinburgh, where he had a numerous acquaintance, until he ſhould find a veſſel to carry him to his native country. We ſeparated from him with much pain, for his excellent moral qualities, and his love for the ſciences, rendered him truly amiable and worthy of all our attachment.

All our buſineſs being at laſt arranged, Count Andreani and I left Edinburgh on the 3d of October, taking the Carliſle road.

About a mile and a half from Edinburgh, the lavas and other volcanic ſubſtances which ſurround that city, diſappear: they are ſucceeded by quartzoſe free-ſtone, which in ſeveral places cover rich mines of coal. This ſandy zone, which is pretty extenſive, diſappears in its turn, and the face of the country again exhibits volcanic ſubſtances from Laſſwade to Selkirk, in paſſing through Middleton, Bankhouſe, Stagehall, Croſslee, &c.

The aſpect of this part of the country is wild and ſterile. The black, blueiſh, and reddiſh brown lavas which we obſerved on the road, were almoſt all diſpoſed in tables or plates like ſlate; but they had all experienced

rienced the action of fire, ſome were of the nature of baſaltes; but others, which were leſs hard, exfoliated and decompoſed in the air.

We proceeded on to Arnſkirk, Hawick, Allanmouth, Binks, Redpath, and Langholm. The mile-ſtone at this laſt place is marked 69 from Edinburgh. Volcanic appearances prevail from Arnſkirk to Langholm. The lavas at Hawick form ſteep hills, and are diſpoſed in horizontal beds, or rather lamellæ, which reſemble ſlate; their colour, however, is more pale. There is little doubt but that all the hills and mountains in this quarter have experienced the action of fire.

Kirk-Andrews, Longtown, Weſtlington, Carliſle.—Sand and quartzoſe free-ſtone of an ochreous red colour—fine cultivation in the neighbourhood of Carliſle—large and excellent ploughs—a number of kilns for making lime, which is uſed for manure. Lime is not only uſed for the meadows, but alſo for the arable land; ſmall heaps are formed which are allowed to ſlack in the air, and are afterwards ſpread over the fields.

A ſtage before we arrived at Carliſle, we had a view of Solway Frith, which ſeparates England from Scotland on the Weſt.

Haraby, Carleton, Lowheſketh, Higheſketh. The ſame materials as above, that is to ſay, ſand, red quartzoſe, free-ſtone, and calcareous ſtones.

Perith. At a mile from this town, on the declivity of a mountain, there are large rounded blocks of baſaltic lava, intermixed with maſſes of granite, which are alſo rounded.

Eumont Bridge, Cliſton, Thrimby. Blocks of reddiſh granite of a conſiderable ſize, with ſome rounded baſaltes, both placed upon beds of calcareous ſtone.

Shap, Hauſefoot. Here the hills of tabulated and foliated lava re-appear. Some of them reſemble thoſe of Mount-Mezen, in Velai, which I have deſcribed in my *Mineralogie des Volcans.*

Kendal, Syzergh. The ſame volcanic appearances.

Haverſham, Milthorpe, Holme, Burton, Dure-Bridge, Carnford, Bolton, Slyne, Lancaſter. This road is almoſt entirely through a calcareous country; rounded baſaltes are, however,

however, ſometimes found ſcattered in the fields. The country is in general rich in paſture. The meadows are manured with a mixture of lime, dung, and common earth, which forms an excellent compoſt.

From Lancaſter we proceeded to Manchester.

CHAPTER XVI.

Manchester.—Doctor Henry and his Cabinet.—Cotton Manufactures.—Messieurs Thomas and Benjamin Potter.—Charles Taylor.

IT was late when we arrived at Manchester. As I had letters to Doctors White and Percival, I wrote to them next morning, requesting to know at what hour it would be convenient for them to see me, but it happened that they were both obliged to visit patients at the distance of some miles from the town. Doctor Percival sent a young German of his acquaintance to state the regret he felt in consequence of not being able to see us; and Doctor White engaged his friend, Doctor Henry, to wait upon us in his stead. These two gentlemen had the complaisance to offer every service in their power, and to shew us whatever was remarkable in the town. They paid us the most polite attention, and never left us during the stay we made in Manchester.

Manchester is a large town; it contains between thirty-six and forty thousand inhabitants;

tants; but if the manufacturers who live in its environs were added to this number, the population would be greatly increaſed, and might be ranked with that of moſt cities of the ſecond order.

The old cathedral is large and well built. We ſaw alſo ſome other ſtructures of this kind which were not unintereſting: the cotton-mills, however, which have enriched this town, were objects ſtill more worthy of engaging our attention.

But notwithſtanding the deſire of our kind conductors to oblige us we found it impoſſible to ſee any thing of the kind. Every attempt was vain. The vigilance of the manufacturers was redoubled in conſequence of having perſuaded themſelves that a French colonel, who was there ſome time before us, wanted to procure plans of theſe machines in order to carry them to France. Since that period no ſtrangers, not even the moſt reſpectable citizens of the town were permitted to enter the works *.

The

* At this time the machine for carding cotton had already been carried to France and was uſed there. Not long after the mills were introduced by an intelligent

The largeſt of theſe cotton-mills are moved by water: they ſpin the cotton to ſo much perfection, and with ſo much economy, that thoſe who firſt erected them have made great fortunes. Arkwright, who invented them, was merely a barber, in the town of Manchester. The difficulties he muſt have had to ſurmount in that ſituation, doubtleſs, add to his merit. He had the good ſenſe to turn his diſcovery to profit. He joined in company with manufacturers whom he enriched, and at the ſame time made a great fortune himſelf.

Though I had not an opportunity of ſeeing the cotton-mills, I was, however, very complaiſantly ſhewn large warehouſes full of manufactured goods. The fineſt pieces were unfolded in order that I might ſee the patterns and the colours. We entered into converſation on the chymical proceſſes uſed in

Engliſhman, who diſputed the merit of the invention with Arkwright. Theſe ingenious machines are now erected in ſeveral departments where they are conſtantly employed. This manufacture will doubtleſs be carried on with ſpirit, until caprice and faſhion return to the uſe of ſilk, that beautiful and ſumptuous production of France, which employed ſuch a number of hands and yielded revenues ſo immenſe.

dying

dying the colours with very intelligent men, particularly with Meſſrs. Thomas and Benjamin Potter, and Mr. Taylor, who treated us in the moſt affable manner. It is with pleaſure I here expreſs the gratitude I feel for their kindneſs.

We were doubtleſs indebted to Doctor Henry for all the politeneſs that was ſhewn to us in Mancheſter. I wiſh that I may one day have an opportunity of making a return to his kindneſs in France. He tranſlated the works of Lavoiſier into Engliſh, and ſtudies chymiſtry much more than natural hiſtory. At his houſe, however, I ſaw ſome ſtones and minerals; but that which gave me the greateſt pleaſure in his collection was a fine foſſile Os femoris, of the unknown animal whoſe bones are found on the banks of the Ohio, and which is perhaps only a loſt ſpecies of the elephant. This Os femoris, which was in the moſt perfect preſervation, weighed forty pounds.

CHAPTER XVII.

Departure from Manchester.—Buxton; its Mineral Waters; fine Baths, constructed on a Plan by Carr, at the Expence of the Duke of Devonshire, the Proprietor of the Waters.—Doctor Pearson.—Manufacture of Vases and other Articles in Fluor Spar of different Colours.—Cave of Poole's Hole.—Toad-stone, composed of a Basis of Trapp, interspersed with Particles of calcareous Spar, and cracked into prismatic Sections like those of basaltes, though not produced by Fire as the latter has been.

WE were received in a very polite manner, as I have already observed, by Doctor Henry, and those to whom he was good enough to introduce us. But we did not experience an equally kind treatment from the master of the *Bull's Head* inn, where we had put up. For two sorry dinners he charged us no less than seventeen shillings a-piece, to which we had to add three shillings to his servants; and this was exclusive of the bill for our domestics. The best thing that poor strangers can do in such a case is to pay the money. Travellers are equally liable to this sort of exaction in Italy, Germany,

Germany, and France, as in England; but in neither is it general or derived from national character. It muſt be imputed to a few individuals only, who have loſt all feelings of delicacy and juſtice, but who make a very wrong calculation with reſpect to their real intereſts, as they ſoon deſtroy both their own reputation and that of the houſes they keep. It is a very difficult matter to deviſe good regulations of police upon this ſubject. It is a truth well known to ſuch as are in the habit of travelling, that the charges are always higheſt at thoſe inns where the entertainment is the worſt. It is to be hoped that ſome remedy will be found for this abuſe; but in the mean time it will be neceſſary for travellers to keep a ſeparate purſe for thoſe plundering inn-keepers, as is done in England for thoſe *gentlemen* who rob on the highways, to whom thoſe who venture to travel at late hours give without fear or danger the ſum which is ſet apart for them. I muſt ſay for my part, however, that I paſſed through England and Scotland twice, and by different roads, without meeting any of theſe *gentlemen*; and that I experienced no extortion but at two places, *Dun's Hotel* in Edinburgh,

burgh, and the *Bull's Head* in Manchester.

From Manchester to Buxton is twenty-four miles. The road through Derbyshire is neither agreeable nor commodious. It sometimes crosses over craggy mountains, and at others runs along narrow, wet and dirty valleys, and though the turnpikes are numerous and dear, the roads are notwithstanding in a bad condition. They are in general, however, well supplied with post-horses. We left Manchester at seven in the morning, and did not reach Buxton till two in the afternoon.

Buxton is remarkable for its mineral waters, for the benefit of which a considerable afflux of company repair thither in the fine season. Buxton, however, is situated in the midst of the most dismal and cheerless country that I have ever seen. Its waters may be excellent, but most certainly its atmosphere is impregnated with sadness and melancholy. The houses, almost entirely of a uniform appearance, but solid construction, resemble hospitals or rather monastic establishments. A superb structure, executed in a grand and beautiful stile of architecture, which appears

at

at the bottom of the place, and is appropriated to the baths, might be taken for the palace of the abbot.

We had letters of recommendation for Doctor Pearſon, a London Phyſician, who belongs to the eſtabliſhment of the baths of Buxton, where he generally ſpends ſix months of the year. We were fortunate enough to find him there, though it was now pretty late in the ſeaſon. As he was well acquainted with the country, and had publiſhed an analyſis of the waters, in which he deſcribed the ſtones and earths that form the ſoil of Buxton, he kindly and readily offered to conduct us to the moſt remarkable mines and caverns, the noted beds of lime-ſtone, in his opinion, interſected with ſeveral currents of lava, and to the different other places mentioned in his book.

Doctor Pearſon was very intimate with Whitehurſt, and had adopted his opinion reſpecting the beds of toad-ſtone, which he regarded as the product of ſubterraneous fire *. We fixed a day for going to ſee theſe ſup-

* *Obſervations and experiments on Buxton Waters, &c. By Doctor Pearſon. London.*

poſed

poſed remains of volcanos in a country, where, on the contrary, every thing indicates the agency of water; and he had the goodneſs, in the mean time, to accompany us to the ſhops of ſeveral artiſts in ſtone, who cut, turn, and poliſh the fine Derbyſhire fluor or phoſphoric ſpars * of different colours, gypſeous alabaſters, and ſome marbles.

WORKERS IN FLUOR OR PHOSPHORIC SPAR.

Several artiſts in this line have ſettled at Buxton on account of the numerous and in general opulent viſitants who reſort thither for the waters, and whoſe fancy or taſte inclines them to purchaſe their productions. The fluor ſpars are turned into ſmall hollow or ſolid vaſes, columns, eggs, pears, and watches, and cut into pyramids, pedeſtals, &c. As the colours are beautiful and variegated, and the ſtone is ſuſceptible of a fine ſhining poliſh, it was formerly ſold at a very high rate; but ſince it has been found in ſo great abundance, the increaſe of artificers, and the conſequent competition among each other,

* The *Fluas calcareus* of the new nomenclature of chymiſtry, page 172.

have

have contributed to diminiſh very much the price of theſe articles of ornament. There are very few among the ſtone-cutters of Buxton who ſhew any taſte for the beautiful forms. They have ſigns above their ſhop-doors with their names and the addition of *petrifaction-works.*

The moſt intelligent of them, in my opinion, was one Noel, who was in eaſy circumſtances, and had ſucceeded well in this branch of trade. He was bringing up to the ſame art a daughter and a ſon, who were already almoſt as well ſkilled in it as himſelf, though the boy was only eight, and the girl nine years of age. It was at his ſhop that the beſt turned vaſes were to be ſeen.

Samuel Cooper had the beſt ſtocked ſhop; but his pieces were dearer than thoſe of the others.

John Evans and Motterſhed, are two other artificers who have pretty good aſſortments.

It is neceſſary to guard againſt a number of little contrivances which they make uſe of to repair the accidents which ſometimes happen to their productions, and conſequently to deceive the purchaſers.

They

They introduce, for inſtance, into the accidental cavities or fractures, which they are dextrous enough at repairing, quantities of lead in its native ſtate, that is, as it comes from the mine. They then poliſh it; and are not wanting in aſſurances to the purchaſer that it is natural to the ſpar, and enhances its value.

I remarked alſo, that to give a finer luſtre to their productions, they had always ſome water at hand to plunge them into, on the pretence that it was only to waſh off the duſt. But it was eaſily ſeen that the water had a ſingular effect in enlivening the colours, the poliſh, and the ſemi-tranſparency of the ſtone.

The fluor ſpar, which is faſhioned at Buxton, is procured from the lead mines of Caſtleton, about ten miles from the former. The only ſtones of value found in the environs of Buxton, are a very fine gypſeous, white, ſemi-tranſparent alabaſter, which is made into vaſes and pedeſtals, a black marble emitting a bituminous ſmell on being rubbed, and a yellowiſh calcareous ſpar, both of which are applied to the ſame purpoſe.

THE

THE BATH-HOUSE.

This ſuperb edifice has more the appearance of a palace than that of a place for bathing. It is a vaſt fabric, in the ſhape of a rotunda, ornamented all round on the outſide with large pilaſters which ſupport a rich cornice crowned with a balluſtrade.

This building, in addition to the ſpace occupied by the baths, contains apartments for more than two hundred gentlemen, excluſively of the chambers for their domeſtics, the perſons employed about the baths and wells, and the different maſters of taverns and ordinaries neceſſary to provide for ſo numerous an aſſemblage, and who are the principal renters of the whole ſtructure. It contains alſo coffee-rooms, gaming-rooms, and ball-rooms.

The whole of this vaſt fabric was erected at the expence of the duke of Devonſhire, upon the plans and under the ſuperintendance of the architect Carr. It is executed in an excellent ſtile of architecture, uniting to a character of grandeur an air of taſte, which does honour to the talents of that able artiſt, whom

I had

I had the pleaſure of ſeeing, and who was kind enough to conduct me through every part of it.

The baths are diſpoſed with the ſame judgment as the other parts of the work. There are common and private ones for the women; thoſe for the men are in a ſeparate quarter and poſſeſs the ſame conveniencies. There are ſeveral alſo appropriated to the uſe of the poor.

The mineral waters for drinking run into a large ciſtern of white marble, over which is erected a neat little temple finely executed in an antique ſtile.

The waters of Buxton are rather moderately warm than hot; as they do not raiſe the mercury in Farhenheits thermometer above eighty-two degrees. Doctor Pearſon, who has analized them, ſays, "that the air which is extricated "from it in great abundance, does not contain "any fixed air, but atmoſpheric mephits, or "the *azotic gas* of the new nomenclature *." This is a very remarkable fact.

The

* The term azot, is derived from the Greek, and ſignifies the privation of life; but, as other gas produce the ſame effect, the word is improper. I do not mean to attack

The village of Buxton is not very conſiderable, and the greater part of the houſes are the property of the duke of Devonſhire. They are generally rented by tavern-keepers, and yield him a great revenue. The one neareſt the baths lets for twelve hundred pounds ſterling; and, I was aſſured, that the baths alone produce a yearly rent of at leaſt thirty-ſix thouſand French livres.

To draw a greater number to the houſes belonging to himſelf, the duke of Devonſhire adopted a plan which has met with complete ſucceſs. Thoſe who are lodged in any of them are charged only ten-pence Engliſh a-day, for the waters, whilſt ſuch as have apartments elſewhere pay a ſhilling a-day.

LITHOLOGY OF THE ENVIRONS OF BUXTON.

Buxton is ſituated in the midſt of a number of ſmall hills, which are quite cloſe to

tack the principles of pnumatic chymiſtry, but its language only. If this malady, which is as dreadful to the language of Racine, Fenelon, Bouffon, Voltaire, &c. as the leproſy is to the beauty of a fine woman, gains ground in the other ſciences, we ſhall ſoon realize the fable of the tower of Babel. A confuſion of language will introduce a confuſion of ideas; and we ſhall thus be replunged in the gloom of barbariſm.

each other, and the higheſt of which does not exceed ſix hundred and fifty feet. The fine river Wye takes its riſe at a little diſtance from the elegant ſtructure of the new baths; and ſoon after plunges into a deep chaſm, and winds along between two approaching cliffs.

The mountains on the road from Buxton to Manchester are compoſed of banks of free-ſtone, in ſome parts hard and in others ſoft and friable, and ſometimes foliated. The hard kind, beſides the name of free-ſtone, is here called *greet*, *grit*, and ſometimes *mill-ſtone-greet*; the foliated kind is termed *ſlate*. Theſe free-ſtones are diſpoſed ſometimes in large horizontal banks, and at other times in foliated ſtrata; they are in general white or reddiſh.

Near theſe, and almoſt oppoſite to them, are hills entirely formed of lime-ſtone in horizontal beds in ſome places, and in a continuous uninterrupted maſs in others. Theſe maſſes are ſometimes divided by perpendicular or diagonal fiſſures.

This lime-ſtone is hard, almoſt of a ſparry texture, and yields on being burnt a lime of a very fine quality. It is uſed,

as

as well as free-ſtone, for making door-caſes, chimney-pieces, pedeſtals, and other works. Its colour is in ſome quarries whitiſh or greyiſh, and in others black. The latter is employed for the ſame purpoſes as marble; and it ſcarcely contains any marine body. It exhales a very diſagreeable ſmell on being rubbed; it may be regarded as a kind of pierrepore.

The grey, on the contrary, contains madrepores, entrochi, and other marine petrifactions. There are alſo found in it ſome pieces of ſilex which are full of entrochitæ. The grey calcareous ſtratum does not poſſeſs the ſame degree of hardneſs throughout. The ſoft part emits a diſagreeable ſmell on being rubbed, not ſo ſtrong, indeed, as that of the black kind, but ſtill very ſenſible. The harder pieces of the grey ſort are uſed for ſeveral domeſtic purpoſes. I ſhall reſume the conſideration of theſe calcareous beds, which are remarkable for the circumſtance of being interrupted with alternate beds of toad-ſtone.

There is alſo found in that part of Derbyſhire called the *Peak*, in which is ſituated Buxton, Matlock, Wirkeſworth, Middleton,

Maſſon Crumford, Winſter, Caſtleton, Eyam, &c. black argillaceous ſchiſtus, more or leſs hard, and ſometimes reſembling ſlate, or as it is here called *ſhale* or *ſhiver*, black and grey martial argil, more or leſs hard, which is not applied to any uſe, and which bears the name of *iron-ſtone*, and red and grey marl, beſides a browniſh kind of marl of a very fine grain, and loaded with calcareous particles, which is uſed like tripoli for poliſhing tin, copper, cryſtal, &c. this kind is called *rotten-ſtone*. In this tract are alſo ſeveral mines of coal, which are worked in abundance. They are not however very deep in general; their roof is a black argillaceous ſchiſtus, marked with numerous prints of ferns, the greater part of which ſeem to be foreign. Here are likewiſe found pyrites, black marble, grey marble, ſoft lime-ſtone, free-ſtone, compact, gypſum, ſtriated gypſum, fluor ſpar of the appearance of amethyſt, yellow, red, grey, or white; and a ponderous fine grained white earth which may be cut as eaſily as chalk, is ſaid to abound in gypſeous earth, and is indifferently termed *caulk*, *calk*, *cawk*, *kewel*, and *keble*. This matter is one of the moſt common matrices of the mines of Derbyſhire, and is frequently

quently ſeen adhering to fluor ſpar *. To the above enumeration may be added double pointed rock cryſtals, ponderous ſpar, and opake fluor ſpar, in detached cubical cryſtals, which three ſubſtances are found on Diamond Hill, about three miles from Buxton; calcareous tolfa, with ſeveral plants incruſted in it, manganeſs in kidney-ſhaped lumps, lead, copper, calamine, and blende; the wells of Matlock old bath, Matlock new bath, and Buxton; the acidulated mineral waters of Quarn, or Quarnden, an intermitting ſpring at Tideſwell, and a number of natural grottos or caverns, ſeveral of which penetrate to a great extent, ſuch as thoſe of Caſtleton, Poole's-hole, Elden-hole, Hoſen's-hole, Burmforth-hole, and Lathkill-arſe. It is very remarkable that pretty copious ſtreams of water iſſue from almoſt all of theſe caverns.

Such is a brief ſketch of the principal objects obſerved in the Peak of Derbyſhire; and this aſtoniſhing variety of ſubſtances within

* It is thought that the *caulk* makes the regulus of antimony more ductile, and gives it a compact texture. It is uſed at Birmingham in the manufactury of yellow copper. Some perſons imagine that it is for the purpoſe of molds, but of this there is no certainty, the greater part of the proceſſes being concealed in the Engliſh manufactories.

ſo ſmall a compaſs, muſt certainly aſtoniſh the moſt experienced geologiſts. We accordingly find Mr. Ferber, ſo well known for his "*Letters on the Mineralogy of Italy*," in the preface to a pamphlet which he has publiſhed on that of Derbyſhire, acknowle'g ng that, without the aid of Mr. Whitehurſt and Mr. Burdett, who has publiſhed a fine map of Derbyſhire, he ſhould have been completely bewildered amidſt the production of ſo ſingular a country.

"I ſincerely acknowledge," ſays he, "that "without the aſſiſtance of theſe two perſons, "I ſhould have frequently found it very diffi- "cult to explain a great number of phæno- "mena which were quite new to me. I "had till then ſeen only homogeneous moun- "tains; and none of the ſtratified mountains "which I had examined, and of the interior "ſtructure of which I had perfect knowledge "by viſiting the mines, furniſhed any in- "ſtance to be compared with what I ſaw in "Derbyſhire. The great diverſity of the "ſtrata and their frequently fantaſtic diſpo- "ſition which I had never ſeen any where "elſe, very often embarraſſed me; and I am

"perſuaded

" perſuaded that the ableſt mineralogiſts will " experience the ſame difficulty *."

THE CAVE OF POOL'S-HOLE.

Mr. Ferber, in his " *Eſſay on the Oryctography of Derbyſhire*," does no more than ſlightly mention the cave of Pool's-hole. " This cave," ſays he, " which is at a little " diſtance from Buxton, abounds in ſtalactite. " It is ſaid to be half an Engliſh league in " length, and a very noiſy ſtream runs " through it."

The following is a more minute deſcription :—Pool's-hole is about a mile from Buxton ; and its entrance is at the foot of a large hill conſiſting of lime-ſtone, bare on all ſides, and preſenting to the view a number of kilns, where the ſtone, which is of an excellent quality, is burnt into lime. This lime-ſtone contains a number of entrochi and other marine bodies, converted for the moſt part into calcareous ſpar.

Doctor Pearſon was ſo obliging as to accompany us to the cave. Scarcely had we

* *Eſſai ſur l'Oryctographie du Derbyſhire, province d'Angleterre, par M. Ferber, traduction de l'Allemand.*

arrived at the mouth of it, which is narrow and of an oblong ſhape, when we were joined by ſeveral women who made briſkly up to us; ſome of them, to ſell us pieces of bad ſtalactite and ſhining calcareous ſpar; and others to furniſh us with lights, and to offer their ſervices in the capacity of guides. We accepted their offers, and entered the cave. Here, as in almoſt all natural caves, are galleries ſometimes narrow, and at others broad, now winding and then running in a ſtraight line, and at intervals expanding into ſpacious and lofty chambers. We were deſired by our guides to ſtop when we came oppoſite to a very large ſtalagmite, which is only an irregular and confuſed accumulation of calcareous ſpar depoſited by the droppings.

This is called by the natives *Poole's chair*. They have heard it termed ſo by their fathers, thoſe who ſucceed them will give it the ſame appellation; and though this ſparry maſs has no more reſemblance to a chair than it has to a horſe, the power of imagination and habit, will concur in maintaining this abſurdity, and thoſe good folks will always have the ſatisfaction of thinking that they ſee what they do not ſee. Alas! this is the caſe

caſe with reſpect to many other things in this world.

On penetrating into a more profound cavity, our conductors were not wanting in telling us that this was *Poole's chamber*; and a little farther we were ſhewn *Poole's table**.

The cave is about two thouſand four hundred and fifty Engliſh feet in length, including the paſſages into it, ſome of which are very incommodious. A ſmall ſtream of water, which becomes more conſiderable perhaps in rainy ſeaſons, runs through the whole length of the galleries, and makes the way a little diſagreeable. Upon the whole, this cave contains nothing very intereſting. We ſaw in it only a few bad and mutilated ſtalactites, and theſe not in any great quantity. From the ſhock of an earthquake, or the looſeneſs and weight of the incumbent maſs, part of the roof of one of the galleries has fallen in, and the paſſage is almoſt entirely blocked up by the number and bulk of the ſtones which have tumbled down.

* Credulity has always amuſed herſelf with ſeeing ſomething marvellous in theſe dark ſubterraneous caverns. There is ſtill ſhewn in the cave of Saſſenage, near Grenoble, the famous table of the fairy Melluſina.

On

On coming out of the cave, we were anew ſurrounded by ſome women, who offered for ſale ſome coarſe pieces of cryſtallized calcareous ſpar, to which they ſeemed to affix a great value.

We then viſited the numerous quarries of lime-ſtone dug on all parts of the hill, which contains the cave of Poole's-hole. More than a undred families have been occupied, from father to ſon, in working the quarries and converting the ſtones into lime. The conſumption of this article muſt be extenſive, and the demand for it very great, for lime-kilns are ſeen ſmoking on every ſide.

I looked in vain for the habitations of ſo many labourers and their numerous families, without being able to ſee ſo much as one cottage, when I at length diſcerned that the whole tribe, like ſo many moles, had formed their reſidence under ground. This compariſon is ſtrictly juſt; not one individual of them lodged in a houſe, or even the hollow of a rock. Their dwellings were in the midſt of heaps of cinders and refuſe of lime, which formed ſo many ſmall mounts, or mole-hills.

Theſe

Theſe materials, which the workmen have hollowed into ſubterraneous habitations, have been conſolidated by rain into a compact cement which is now impenetrable to the water. As the excavation is not very difficult, theſe families have taken ſufficient precaution againſt cold and wet, by fixing their abode immediately contiguous to the lime-kilns which communicate to them a comfortable degree of warmth.

The greater part of theſe habitations have three or four rooms, almoſt all of a round form, for the purpoſe of greater ſolidity. They are lighted by the ſide, when the poſition is ſuch as to admit it; or merely by the chimney, which is nothing elſe than a round hole pierced through the middle of the roof to allow the ſmoke to eſcape. Apertures are alſo made by the door of the place to admit a little light. Such is the effect of the whole, that when the workmen deſcend into their cave, at the hours of repaſt, nd a ſtranger ſees ſo many ſmall columns of ſmoke iſſuing out of the earth, he imagines himſelf in the midſt of a village in Lapland. I felt much pleaſure in viſiting the reſidence of theſe troglodytes. Their occupation is certainly not attended with

with much profi as they are unable to procure the ſmalleſt convenience, and though in the midſt of ſtones and lime, have hitherto been too poor to erect walls.

STONES KNOWN IN DERBYSHIRE BY THE NAME OF TOAD-STONE.

As I had now reached the principal ſource of theſe ſtones, ſo much talked of by the Engliſh Naturaliſts, and which furniſhed the baſis of Mr. Whitehurſt's theory, I reſolved to examine them with the moſt ſcrupulous attention. I had the advantage of being accompanied by a mineralogiſt of the ſchool of Mr. Whitehurſt, who was well acquainted with the place, and who, like him, was convinced that the different ſpecies of toad-ſtone were real lavas. I was under a promiſe, beſides, of giving an account of my reſearches to Mr. Whitehurſt himſelf. Being provided with his book, and Mr. Ferber's eſſay on the oryctography of Derbyſhire, the only remaining preparation requiſite was the inſtructing myſelf in the vocabulary of the miners. The names which they have at all times given this ſtone, vary according to its colour, its hard-

neſs,

neſs, he extraneous bodies found in it, and the diſpoſition of its ſtrata. Theſe names are not ſcientific, it is true; but the miners are accuſtomed to them, and perfectly underſtand them, being derived from their native language; and it is not to be ſuppoſed that they will ever be induced to change them.

This ſtone derives its name from its reſemblance to the colour of a *toad*, having a very dark brown and ſometimes black, baſis entirely ſprinkled over with ſmall particles of white calcareous ſpar. Theſe white ſpecks are in general, pretty uniform, and ſometimes protuberant. A ſtone in every reſpect ſimilar is found in the bed of the torrent of Drac, near Grenoble, by which it is hurried along from the high Alps of Champſaur. It is from this ſpotted appearance that it has received the name of *Variolite du Drac.* But this term already affixed to a ſtone of a different ſort, ought to be rejected, in order to prevent miſtakes.

The term toad-ſtone is very common at Buxton, Matlock and Winſter, becauſe ſtones of this kind are more frequent there than in the other lead or copper mines of Derbyſhire.

At

At Tideſwell, the ſame ſtone, but with few or no globules of calcareous ſpar, and diſpoſed in thick banks, which alternate with beds of lime-ſtone, bears the name of *channe*.

At Aſhover, in the mine of Gregori, being of a blacker kind and not ſo hard, it is called *black clay*.

At Caſtletown, the miners have given to a greeniſh variety of this ſtone, which falls into earth on expoſure to the air, the ſingular name of *cat-dirt*.

Mr. Ferber, in his eſſay on the oryctography of Derbyſhire, pages 163 and 168, mentions only the two denominations of *toad-ſtone* and *channel*; but he adds, that the ſame ſtone bears in England the names of *dun-ſtone* and *black-ſtone*, and in Scotland, that of *whin-ſtone*. It is certain that the Derbyſhire miners know very well how to apply the four different names which they give it, according to its different modifications. This is not the caſe with reſpect to the Engliſh term *black-ſtone*, which may be equally applied to other ſtones of the ſame colour, but of a very different nature, ſuch as volcanic baſaltes, touch-ſtone, black rock-ſchorl, horn-ſtone, certain

fine

fine grained black granites, &c. This denomination is, therefore, too general and vague.

The term *whin-ſtone*, which the Scotch employ, is no leſs objectionable. Under this name they comprehend every black ſtone, without diſtinction, which is hard and rough to the touch. At Edinburgh, when I aſked the naturaliſts and workmen of the country to ſhew me whin-ſtone, ſome of them brought me a black hard ſtone of the ſame nature with what the Swedes call trapp, which is not in the leaſt volcanic, ſome preſented a compact lava of the nature of baſaltes, and others a variety of black granite, which has ſuſtained the action of ſubterraneous fire without any alteration in its hardneſs, and which makes moſt excellent pavements. The caſe was the ſame at Glaſgow. This term, then, having like the preceding, a variety of acceptations, which tend to produce confuſion in the mind, ought to be rejected on the ſame account. A fact worthy of remark, and which proves that the colour of ſtone has been more attended to than any other characteriſtic, is, that in Germany, where the ſcience of mineralogy has long flouriſhed, ſeveral black hard ſtones, of very different

different natures, are likewiſe denominated *black-ſtones*, ſchwartz-ſtein *.

Mr. Ferber, though profoundly verſed in mineralogy, neither compares the toad-ſtone of Derbyſhire to any other ſtone, gives it any diſtinctive name, nor takes any notice of the opinion of Mr. Whitehurſt, who regards it as a volcanic product. He contents himſelf with ſtating, that "this ſtone has an argil-"laceous baſis more or leſs hard; ſome parts "appearing to be merely an indurated clay, "whilſt others approach the jaſper in hard-"neſs; that it is interſperſed with ſmall par-"ticles of calcareous ſpar, varying in form "and ſize; ſome of which are ſo minute "that to the eye they appear identified with "the black ſubſtance of the ſtone itſelf, whilſt "others are of the bigneſs of a pea, or even a "bean." He adds, "that on trying the ſtone

* In France, as in other places, we have in ſeveral inſtances given names to mountains from the colour of their rocks; ſuch as roche *maure* for roche noire (black rock) roque *brune peire neir*, for roche brune (brown rock) pierre noire (black ſtone) &c. But on every occaſion when I have ſhewed to peaſants of any degree of intelligence, pieces of compact lava, and blocks or columns of baſaltes, and aſked them how they termed thoſe ſtones, they have uniformly replied, that they were *pierres mortes* (*dead ſtones.*)

"with

" with acids, they effervesced with and dis-
" solved the portions of calcareous spar with-
" out effecting any change in the basis of the
" stone; which, after the experiment, was
" still hard enough to scratch glass, though it
" gave only a few inconsiderable sparks with
" steel; and finally, that the substance of the
" toad-stone, when divested of its calcareous
" particles, seemed to him to be refractory to
" the blow-pipe, but that with the addition
" of salt of tartar it was converted into a
" black scoria, which would seem to indicate a
" siliceous principle, though it does not possess
" the hardness of siliceous stones."

To enable those naturalists, who have not visited the place, to form a correct notion of this stone, and to accompany me in the following examination, it only remains that I should give them a preliminary description of the singular position which it occupies in the mountains of the Peak of Derbyshire. A part of the details I shall borrow from Mr. Whitehurst and Mr. Ferber, adding to them what additional circumstances have fallen under my own observation.

DIFFERENT SUBSTANCES WHICH PRECEDE AND ACCOMPANY THE TOAD-STONE OF THE PEAK OF DERBYSHIRE.

1. Quartzoſe greet, gret, or free-ſtone; termed mill-ſtone by Mr. Whitehurſt from the uſe to which it is applied in ſome places; it varies in its colour, grain, hardneſs, and the thickneſs of its ſtrata. This naturaliſt, in in page 147 of his "Inquiry into the original ſtate and formation of the Earth, ſays, "that "the bank is 120 yards in thickneſs, and com-"poſed of granulated quartz and quartz peb-"bles. The former retain the ſharpneſs of "fragments newly broken, the latter are "rounded by attrition as ſtones upon a ſea "beach."

2. Black argillaceous ſchiſtus of the nature of ſlate, ſhale or ſhiver. Its thickneſs, according to Mr. Ferber, who meaſured it in the mine of Yateſtoop, is from a hundred and forty to a hundred and fifty feet *; and according to Mr. Whitehurſt, who meaſured it in another place, about a hundred and twenty yards †. As it is uſeful, when giving a local deſcription, to be acquainted with the nomenclature of the miners, it is proper to ſtate that

* Page 160. † Page 148.

they

they give the toad-ſtone ſeveral denominations according to its greater or leſs hardneſs, or as it is more or leſs penetrable. Hence the various terms of *ſhale*, *hard-beds*, *penny-ſhale*, and *black-beds*.

There are found above this ſchiſtus at ſeveral places, and, among others, near Winſter, where the high-way is opened through beds of it, which are completely viſible, large fragments of black lime-ſtone, which on being rubbed with iron, emits a ſtrong ſmell of burnt corn.

3. The firſt bed of lime-ſtone, which, in the neighbourhood of Daſhford, is black, very hard and uſed as marble. It has an offenſive ſmell on being rubbed, is in ſome parts without any marine bodies, and in others abounds in *anonymæ bivalves*; it ſometimes contains round knobs of ſilex, and is interſected at intervals with thin layers of a kind of ſlate. The thickneſs of this bank varies from thirty-five to fifty feet.

4. Firſt bed of toad-ſtone. The thickneſs of this bed varies greatly: in ſome places it is fourteen, and in others ſixteen feet, and at Tideſwell it has been dug to the depth of a hundred and ſixty feet without reaching its bottom; though, in the ſame mine, at the

diſtance of a hundred toiſes only from this ſpot, it is no more than forty feet; and three hundred toiſes farther, only three feet. This would ſeem to ſhew that the matter which compoſes the toad-ſtone has accumulated there rather in one vaſt depoſit than in regular beds.

But let us hear Mr. Whitehurſt, whoſe opinion upon this ſtone is very explicit: "Toad-ſtone is a blackiſh ſubſtance, very "hard; contains bladder-holes like the *ſcoria* "of metals, or Iceland lava, and has the ſame "chymical property of reſiſting acids. Some "of its bladder-holes are filled with [cal-"careous] ſpar, others only in part, and others "again are quite empty. This *ſtratum* is not "laminated, but conſiſts of one entire ſolid "maſs, and breaks alike in all directions. It "does not produce any minerals or figured "ſtones repreſenting any part of the animal "or vegetable creation.—Neither does it uni-"verſally prevail, as the lime-ſtone ſtrata, nor "is it like them equally thick; but in ſome "inſtances varies in thickneſs from ſix feet "to ſix hundred. It is likewiſe attended with "other circumſtances, which leave no room "to doubt of its being as much a lava, as that "which flows from Hecla, Veſuvius or Etna."

A ſecond

A ſecond reaſon, which induced the Engliſh naturaliſt to regard the toad-ſtone as a real lava of poſterior exiſtence to the formation of the calcareous beds, is, that the vertical fiſſures with which the latter are occaſionally interſected, are filled with toad-ſtone; which neceſſarily infers the pre-exiſtence of theſe fiſſures, and conſequently that of the calcareous ſtrata.

5. The ſecond bed of lime-ſtone. This is about thirty-three toiſes thick, of a grey appearance, and contains a number of petrified marine bodies, among which may be diſtinguiſhed *cames* of a large ſize, madrepores, &c. The ſtone is not in all parts of equal hardneſs. The ſofter parts, which emit a diſagreeable ſmell on being rubbed with iron, are uſed for making lime. The harder parts are cut into ſhape, receive a poliſh, and anſwer the ſame purpoſes as marble. Some parts of it are penetrated with a ſiliceous matter in which are ſeveral entrochi.

6. Second bed of toad-ſtone, which is forty feet thick. Mr. Ferber ſays, "that in "the mine of Hubberdale, this ſtone deviates "ſo much from its ordinary hardneſs that it "has a perfect reſemblance to ſoft clay." But this alteration, which is doubtleſs ob-

ſerved in ſome pits, is merely local; and the toad-ſtone of the ſecond bed, as Mr. Whitehurſt juſtly ſtates, is of greater ſolidity than that of the firſt. A circumſtance worthy of attention is, that it contains no cavity, and conſequently no particles of calcareous ſpar.

7. Third bed of lime-ſtone; grey, like the ſecond, and, according to Mr. Ferber, ſeventy yards thick. Mr. Whitehurſt ſays, that it contains fewer petrefactions than the preceding ones, and that it is thirty fathoms thick.

8. Third bed of toad-ſtone, reſembling the ſecond, and twenty-two feet thick. "In the "mine of Hubberdale," ſays Mr. Ferber, "this ſtone has the conſiſtence of a tender "and ſoft clay of a green colour, and is filled "with ſmall nodules of black clay, and ſe-"veral veins of white calcareous ſpar. It is "denominated channel."

9. Fourth bed of lime-ſtone. This is grey, like the preceding, but a little whiter. Its thickneſs is yet unknown; ſeveral parts of it having been dug to the depth of forty fathoms, without diſcovering its bottom. It is therefore uncertain whether this fourth calcareous bed be again ſucceeded by toad-ſtone.

The

The direction of the veins of metal is in general very irregular; the ſeam is diſtinct and well marked; its depth varies, being ſometimes ſeveral feet only, and at others ſeveral toiſes thick.

But what is truly extraordinary and may be regarded as a phenomenon in mineralogy, is, that the veins, which are very rich in the four calcareous beds, always diſappear, as they approach the ſtrata of toad-ſtone, which alternate with the former, ſo that it is neceſſary to penetrate through the whole maſs of toad-ſtone, however thick, in the direction of the ſeam, without any trace of the ore, until the calcareous bed be reached, where the miners are ſure of re-diſcovering it. Thus, for example, when a vein is exhauſted in the firſt bed, that is, in the firſt black lime-ſtone, the ore diſappears on reaching the toad-ſtone, and no veſtige of it is found till the bed of toad-ſtone has been entirely dug through. "This phenomenon," Mr. Ferber juſtly ſays, "is, without contradiction, one of the moſt "rare and ſingular in its kind; and to ac- "count for it is no leſs difficult. Another "ſingularity reſpecting the beds of toad-ſtone "is, that this ſubſtance ſo completely ſeparates

" the different ſtrata of lime-ſtone, that an " inundation of a gallery in the firſt bed no- " wiſe diſturbs the labours in the ſecond, " and that the miners may be dry in a lower " gallery, whilſt all the galleries above it are " filled with water."

From violent diſruptions of the ground, at periods too remote to be traced, the beds are found ſunk to a great depth in ſome parts, while they are much nearer the ſurface in others. New adventitious and calcareous ſubſtances, tranſported by ſubſequent convulſions, have filled up many of theſe chaſms, and thus partly concealed the firſt ruggedneſs of that wonderful country; but the deep excavations which the miners have made through a great extent of the elevated flat of the Peak, have furniſhed the means of obtaining an exact knowledge of the topography of Derbyſhire, of which I have juſt here given a ſlight ſketch. More detailed explanations will be found in the work of Mr. Whitehurſt, who has given very accurate engravings of the plans, and profiles of the moſt intereſting ſections of the mountains.

Impreſſed with the importance of the ſubject, I had ſtopped ſeveral times before I reached

reached Buxton, at the foot of ſome crags where the toad-ſtone was viſible, for the purpoſe of examining it. With the ſame view I now asked Dr. Pearſon, whether, in his work on the mineral waters of Buxton, he had particularized any bed of toad-ſtone which we might viſit together, aſſuring him, that any information which he could give me would be ſo much the more gratifying, as nothing that I had yet ſeen in that part of Derbyſhire bore the leaſt trace of a volcano? I further obſerved, that a ſtone in every reſpect the ſame as the toad-ſtone, which he regarded with Whitehurſt as a real lava, was found on the high Alps of Champſaur in Dauphiny; that it preſented preciſely the ſame varieties of toad-ſtone, with particles of calcareous ſpar, with empty cellulæ, and without any ſpar, often imporous, ſometimes hard and compact, at other times tender, tending to decompoſition and changing its colour, and that it was ſometimes found in the form of ſmall priſms, which led me to think that we might probably meet with it here in the ſame ſtate.

I mentioned alſo, that M. De Lamanon, a very eſtimable naturaliſt, who fell a victim to his ardour for natural hiſtory, in a voyage round

round the world with La Peyrouſe, had written a pamphlet tending to demonſtrate that the ſtone of Champſaur was a product of ſubterraneous fire; and that he for ſome time conſidered himſelf the diſcoverer of an extinct volcano in the Alps; though very able naturaliſts had affirmed that thoſe vaſt mountains exhibited no veſtige of volcanic combuſtion. I added, however, that M. De Lamanon, whoſe opinion I combated, relinquiſhed his error and ſuppreſſed the whole impreſſion of his work, with the reſerve of twelve copies, to each of which he had the honourable firmneſs to annex a printed recantation; that thoſe few were ſent to the moſt zealous of his opponents as an acknowledgment that the ſtones which he had taken for lavas were merely trapps, and that he had the goodneſs to ſend me one among the reſt*.

* See my eſſay on trapp-ſtones, in which I have traced the itinerary from Grenoble to the mountain of Chaillot-le-vieil, in the Alps of Champſaur, with a deſcription of all the varieties of trapp, in every reſpect like thoſe of Derbyſhire, in a much higher country; for the mountain *Peyre-Niere* (Pierre noire) or *Haut-Puy*, which is about one thouſand four hundred toiſes above the level of the ſea, is covered to the top with real toad-ſtones, that is to ſay, trapps.

Excurſion

Excurſion in the Vicinity of Buxton with Doctor Pearſon.—The Stratum of Toad-ſtone which he deſcribes in his Book on the Mineral Waters.—A ſmall Iſle in the River Wye formed entirely of Toad-ſtone divided into Priſms.

" Let us ſet off then," ſaid Doctor Pearſon, " I ſhall be very happy to ſhew you the " bed of toad-ſtone that I have deſcribed, " and you will tell me what you think of it." We directed our courſe to the hollow which forms the bed of the little river Wye, which, if we may judge by the channel which it has worn, ſwells into a torrent with rains. We aſcended its banks for nearly a mile towards a corn-mill.

Before reaching the mill, particularly on the right bank, and immediately under the vegetable ſoil, are ſome beds of black ſchiſtus which vary in thickneſs and exfoliate in ſmall pieces on being expoſed to the air. This ſchiſtus is ſometimes covered with a ſlight efflorescence of martial vitriol; it is the ſame which the miners called *ſhale* or *ſhiver*. This bed of ſchiſtus, which is in ſome parts three, and in others two feet thick, and which conceals itſelf at intervals under the vegetable ſoil,

ſoil, purſues the ſame direction to the verge of the mill where it entirely diſappears.

Here the nature of the ground ſuddenly changes; the valley diminiſhing into a narrow ſtrait formed by two calcareous hills, approaching each other. Between theſe the mill is erected: the conſtruction of the channel muſt have ſuggeſted this as a very proper ſituation.

The calcareous rock is of a grey appearance, and its ſtrata incline towards the bed of the river on both ſides; but ſo vigorous is vegetation in this humid region, that, except in a few places, the rocks are completely covered with moſſes, lichens, heath, and other creeping plants.

The road leading to the mill runs along a natural cauſeway formed by the rocks which are entirely bare in this deep hollow. A little above this mill the road is croſſed with a bed of toad-ſtone ſeveral feet thick, the black colour of which forms a ſtriking contraſt with the grey lime-ſtone.

This is the bed of toad-ſtone which Doctor Pearſon has drawn as alternating with lime-ſtone. But on examining it attentively, I obſerved to this naturaliſt, that it was difficult

cult to determine whether it was a real bed or a kind of vein; the numerous chaſms which muſt have formerly exiſted in both the hills, from the falling in of the ſurface, and the vegetable earth with which they have been in general filled up again, ſcarcely permit one to aſcertain with any degree of certainty the exact and primitive diſpoſition of the calcareous beds.

On an inſpection of the parts where the toad-ſtone is uncovered, it appears rather to interſect tranſverſely than to follow the direction of the calcareous ſtrata, a fact, which if ſufficiently aſcertained, would be completely deſtructive of the Doctor's hypotheſis founded on the ſtratification of the calcareous beds in alternate order with toad-ſtone.

An attentive obſervation, indeed, of this ſmall valley or hollow, formed by the ſubſidence of the intermediate ſpace through which the Wye now flows, warrants the ſuppoſition that the chaſms, cavities, and fiſſures occaſioned by the ſhock and falling in of ſuch enormous maſſes, have been again filled up by a ſecondary depoſition and alluvion, proceeding from a revolution poſterior to that which produced them.

Theſe

Theſe reflexions I ſubmitted to the conſideration of Doctor Pearſon, ſtating, at the ſame time that my conjecture would have ſtill greater probability if we ſhould find the toad-ſtone lying in a maſs above the lime-ſtone, at the bottom of the valley.

Whilſt I was making theſe obſervations, I caſt my eyes on a ſmall iſle of an oblong form, ſituated in the very center of the place in queſtion. "Let us ſee," ſaid I, "whether that kind of natural mound, "which has by its reſiſtance, forced the river "to divide into branches, conſiſts of the ſame "ſtone as the neighbouring hills."

Doctor Pearſon ſaid, that he had not directed his enquiries to that ſpot. We then repaired to the ſmall iſle, which is about a hundred paces long, and from ten to twelve paces broad, but which muſt have been much more conſiderable, before it was worn away by the water. It riſes only a few feet above the river.

With equal pleaſure and aſtoniſhment we diſcovered that it was entirely compoſed of a blackiſh brown toad-ſtone, filled in ſome parts with particles of calcareous ſpar, and in others thinly maculated, or without any at all. But what I regarded as moſt remarkable was,

was, that the firſt or uppermoſt ſtratum of toad-ſtone, which is about two feet and a half thick, is in ſeveral places divided into priſms which form the moſt exact repreſentation of a ſmall baſaltic cauſeway. It is ſtill farther aſtoniſhing, that it affects all the various appearances of the round balls of baſaltes, which are often found beſide the priſms, or into which the priſms themſelves are ſometimes changed by the mouldering of their angles. Theſe balls are formed of concentric layers, and exfoliate in the ſame manner as thoſe of baſaltes *.

* "Trapp," ſays the celebrated Bergmann, "is ſometimes found in the form of triangular priſms, though this "is a rare caſe. It ſometimes has the appearance of immenſe columns, ſuch, for inſtance, as the *Traſtlemary* at "the foot of the mountain of *Hunneberg*, oppoſite to *Bragnum*, which have detached themſelves from the reſt of "the maſs. The firſt time I ſaw them, they formed an "angle of eight degrees with a line perpendicular to the "horizon. For almoſt all the mountains of Weſtrogothia "that have a ſtratified form, the upper bed conſiſts of "trapp. It is important to obſerve, that this bed always "repoſes on a black alluminous ſlate. Is it poſſible then "that this matter ſhould have been in a ſtate of fuſion "without the ſlighteſt diminution, even in the point of "contact, of the blackneſs of the ſlate below it, though it is "evidently alterable by the heat of our common fires? We "have a ſtill finer trapp, which generally runs in veins, "and is frequently found in very ancient mountains, in "which not the fainteſt marks of ſubterraneous fire can "be ſeen."

Lettres de Bergmann a Treil, page 448, de la traduction des *Lettres ſur l'Iſlande.*

Theſe

Theſe priſms and balls are in a ſtate of commencing decompoſition; they are of a brown colour, and ſometimes of a yellowiſh iron grey. Their texture is often intermixed with numerous particles of calcareous ſpar, the colour of which is frequently ſtained with the tints produced by the decompoſition of the toad-ſtone. This ſtone, ſo divided into priſms and balls, repoſes on a bed of friable and gravelly matter, which is in reality nothing elſe than toad-ſtone decompoſed and reduced to the form of a ſandy earth.

It muſt be acknowledged that nothing can be more volcanic in appearance than this little iſle of toad-ſtone. A vein of this matter, which has conſiderable reſemblance to a current of lava, croſſes the calcareous rock which forms the bottom of the mill-road, and then ſinks and loſes itſelf in the Wye, ſo as to lead one to imagine that it has given riſe to the iſle, which is compoſed of a ſubſtance, which, in the parts where the particles of calcareous ſpar have been deſtroyed has the colour and appearance of certain porous lavas, and is further poſſeſſed of priſmatic and ſpherical configurations. There is nothing, how-

however, really volcanic, either in this place or its vicinity.

This ſerves to ſhew the utility of correct local deſcriptions to the progreſs of natural hiſtory, and the importance of having, in certain circumſtances, an opportunity of ſeeing ſubſtances in their native place.

The ſubſtance of toad-ſtone is a compoſition of ſiliceous and argillaceous earths, with a ſmall quantity of calcareous earth and ron. The proportions of the component parts differ according to the varieties of the toad-ſtone. That of Derbyſhire, which is the ſubject of our preſent enquiry, has been analyzed by Doctor Withering, who found that in *a hundred parts of this ſtone there are ſixty-three parts of ſiliceous earth, fourteen of argillaceous earth, and ſeven of phlogiſticated iron.*

I myſelf, alſo, analyzed a piece of the ſame ſtone which was broken off from a part that had no calcareous particles; the reſults which I obtained were a little different. From a hundred grains of it the produce was as follows:

Siliceous earth -	54 grains.
Argillaceous earth -	19
Aerated calcareous earth	8
Aerated magneſia	4
Iron - -	13
Loſt during the proceſs	2
Total	100

In making other experiments on ſtones of the ſame kind, taken from different beds, I always found the ſame conſtituent principles, but with greater or leſs variations in the reſults; ſometimes the iron, and at other times the calcareous or argillaceous earth, being in greateſt quantity. In a word, and to conclude this already too long and fatiguing diſcuſſion, the toad-ſtone of Derbyſhire, is entirely foreign to volcanos, and is preciſely the ſame with the Swediſh trapp *.

Some

* If the reader wiſh for ſtill further information reſpecting this ſtone, he may conſult page 7, 23, 31, 43, and 53, of the work which I have publiſhed on trapp-ſtones; where he will find that the *argilla martialis indurata* of Cronſtedt, the *ſchwartzſtein* of the Germans, the *toad-ſtone*, *channel*, *cat-dirt*, and *black clay*, of Derbyſhire, the *whin-ſtone* of the Scotch, and the *variolite du drac* of ſome Frenchmen, are nothing elſe than trapp in a greater or leſs degree of hardneſs,

Some may perhaps blame me for wiſhing to generalize too much the name given to a ſtone which is in the claſs of compounds, and which itſelf ſerves as the baſis of ſeveral other ſtones. But I have never pretended to affix the denomination trapp, excluſively of all others, to ſtones, abounding in the matter of trapp, in thoſe caſes where they are diverſified by a peculiar character. I have not, for example, ceaſed to uſe the terms porphyry, amygdaloides, variolite, &c. though trapp be the baſis of all theſe ſtones.

I perfectly coincide with the opinion of my illuſtrious friend, M. de Sauſſure, that "when "two foſſils exhibit any remarkable differ-"ence of character we are not to refrain from "diſtinguiſhing them by different names, on "the pretence that there are intermediate "varieties which appear to unite them, by "being equally referrible to either *."

It is with the view of cloſely adhering to this principle, that, whilſt I ſtill preſerve the

neſs, and more or leſs altered. This ſtone alſo forms the baſis of the moſt part of porphyries, &c. &c But whilſt I wiſh to retain the genuine term trapp, I would conjoin with it the different vulgar names which the miners uſe to diſtinguiſh its various modifications.

* Voyage Dans les Alpes, in 4to. Tom. iv. p. 127.

genuine term *trapp*, which muſt be reſpected, as it has always been uſed by the mineralogiſts of the north, I would apply it by way of preference, and ſpecifically to that ſtone in every caſe where it has the hardneſs, the colour, and the homogeneous appearance which is peculiar to itſelf, and is void of any very diſtinguiſhable extraneous body. But when it contains any particles of calcareous ſpar, I—would call it, with the miners of Derbyſhire, *toad-ſtone*. When the trapp, however pure, has loſt its hardneſs, and its original colour, particularly when it inclines to a greeniſh colour, and when I at the ſame time find it in the form of ſmall veins interſecting rocks of another nature, would I never heſitate to call it *cat-dirt*; and thus I would proceed with reſpect to all the other known modifications as often as they are ſufficiently diſtinct. This is the moſt ſimple manner of making ourſelves underſtood, and at the ſame time reſpecting the works and the memory of thoſe naturaliſts who have cleared for us the thorny paths of ſcience.

CHAP-

CHAPTER XVIII.

Caſtleton.—Deſcription of the Cave called The Devil's Arſe.—Mines of Lead and Calamine, Veins of Fluor Spar.—Lead found in Channel or Catdirt.

WE rode from Buxton to Caſtleton, a diſtance of twelve miles, on one of the fineſt days of autumn, but along a road as diſagreeable and fatiguing as the worſt of winter.

During our ſtay in this little place, which is agreeably ſituated in the midſt of ſome mountains, we had an opportunity of ſeeing the different workmen in fluor ſpar, and viſited the magnificent cavern called the *Devil's Arſe*, near Caſtleton, and likewiſe ſeveral mines in its vicinity. The reſult of my obſervations is as follows:

DESCRIPTION OF THE CAVE OF CASTLETON, VULGARLY KNOWN BY THE NAME OF THE DEVIL'S ARSE.

This cave, regarded at all times as the principal of the ſeven wonders of Derbyſhire,

has been celebrated by ſeveral poets. But as, ſince the time of Homer, Virgil, and Ovid, who united extenſive knowledge to ſublime talents, few poets have pretended to ſcientific correctneſs in their deſcription of phyſical facts, I ſhall not here repeat any of the verſes, with which the Engliſh Muſes may have inſpired thoſe who have deſcribed this grand work of nature.

I feel more ſatisfaction in telling my readers, that this cave has been honoured with the viſits of ſeveral reſpectable men of ſcience, among the lateſt of whom were, Sir Joſeph Banks, Preſident of the Royal Society of London and Dr. Solander, accompanied by Omai, a native of the South Seas, who was received with the moſt lively intereſt in England, where he remained a conſiderable time, and after being loaded with preſents, was generouſly conveyed back to his own country.

This cavern is ſituated at the foot of a vaſt range of rocks thrown up by nature on the ſide of a ſteep mountain, upon which ſtands an old caſtle, built, it is ſaid, in the time of Edward the black prince.

The principal entrance is 120 Engliſh feet in width, and forty in height; it forms a circular

cular arch which opens in a rock of grey, and ſomewhat ſparry, lime-ſtone, ſufficiently hard to admit a fine poliſh, and containing a number of marine petrifactions, among which the entrochi and ſome *anonymæ* of a very large ſpecies, are the moſt common. This ſtone, on being rubbed againſt a hard body, gives a ſmell ſomewhat like that of burnt corn, and ſome parts of it, which are of a deeper grey and more ſparry grain than the reſt, emit ſo ſtrong a ſmell, that it may very juſtly be claſſed among the *lapides ſuillæ* or ſtinking ſtones.

An inhabitant of the place who gains a ſubſiſtence by conducting ſtrangers into the interior of the cave, having learnt our arrival, came to wait upon us. He firſt preſented each of us with a printed paper containing the moſt ridiculous and exaggerated details of the extraordinary things which were to be ſhown to us, preceded by the following ſhort preamble; "As many perſons have com-"plained of the exorbitant ſums demanded "by thoſe who ſhow this cave, it is proper "the public ſhould be informed of what ought "to be given, as thoſe who ſhew it pay no "rent to the king. One perſon ought to pay

" two ſhillings and ſixpence (about three " French livres); and a party at one time, " five ſhillings. Theſe prices, however, are " not fixed; and the public may give more " or leſs as they chooſe. J. HALL."

J. Hall has adopted in this preamble a very ingenious mode of taxing his cuſtomers. But I muſt do him the juſtice to acknowledge that he is very active and obliging, anticipates every queſtion, and does not fail to give the moſt minute details reſpecting thoſe objects which he conceives deſerving of remark. In ſhort, he is perfectly maſter of his leſſon, and recites it with a conſequential gravity and ſometimes with a tone of enthuſiaſm, calculated to attract the attention of thoſe who are under his guidance in this darkſome cavern.

A party of Engliſhmen joined us, and we entered the outer porch. It is lighted from without, is forty-two feet high, a hundred and twenty feet wide, and two hundred and forty-ſix feet long. The light was pretty ſtrong at the entrance of this vaſt vault, but gradually diminiſhed as we proceeded inwards, or as the fore parts were broken into projections of a greater or ſmaller bulk. The effect

is

is ſo much greater as the ſcene is enlivened with two manufactories, the one a rope yard, and the other an inkle manufactory entirely within the place.

All is life and motion in this apparent ſolitude. On the one ſide are ſeen young girls turning their wheels, winding up their threads, and lightening their labours with their ſongs, and on the other, men ſpinning cords and twiſting cables, or forming them into coils. What is ſtill more extraordinary, there are two houſes in this ſubterraneous apartment ſtanding oppoſite to each other, entirely ſeparate from the rock, with roofs, chimnies, doors, windows, and inhabited by ſeveral families.

It is difficult, without having ſeen it, to conceive the effect produced by the view of two houſes in a ſituation of this kind. We were ſoon ſurrounded with ſeveral groups of young girls, ſome of whom were very handſome.

It appeared that J. Hall here yielded the pre-eminence to the ladies of the place, reſerving excluſively to himſelf the privilege only of exhibiting to the more profound caverns; all theſe young girls flocked to ſhew

us

us the rope and inkle manufactories, and the interior of the two dwelling-houſes; after which they directed our admiration to the beauty of the veſtibule, the great height of the vault, and the curtains of ſtalactite which decorate it.

They called our attention more particularly to a ſtalactite of an extraordinary form at the beginning of the principal arch, a little beyond the fartheſt houſe, and at the height of about thirty-five feet. "See," ſaid they, "the fa-"mous *leg of pork*; obſerve its excellent "ſhape, and admire this maſter-piece of na-"ture." But the more we examined this pretended *leg of pork* the more did we find it reſemble an object which young girls are not often permitted to examine, and of which they are ſtill more rarely permitted to allow an examination to others. This object was a heart and not a leg; but it was a heart of the ſame kind as that of M. de Bouflers. This ſhews the facility with which young folks may be perſuaded that they ſee what they do not ſee; but it is at the ſame time a proof of their amiable candour and innocence. Decency, however, demanded that we ſhould preſerve a grave and ſerious countenance.

Teſti-

Teſtifying our grateful ſenſe of their ſervices by a ſmall preſent, we took leave of them, and proceeded under the auſpices of Hall, who, after diſtributing to each of us a lighted flambeau, opened the door of a ſubterraneous gallery at the bottom of the grand veſtibule, and deſired us to follow his ſteps through the darkſome labyrinth of which he willingly held the clue.

The way appeared at fir neither agreeable nor eaſy. In ſome places we proceeded in an upright and free poſture, whilſt in others parts the vaults were ſo low, that we were obliged to ſtoop as we advanced, to avoid ſtriking againſt the protuberances of the rock. This firſt gallery is a hundred and forty feet long. Here we obſerved a quantity of ſand accumulated into a ſmall oblong eminence. Hall, who was attentive to the minuteſt circumſtances, did not forget to excite our admiration at this ſand, which was the production, he ſaid, of a ſmall ſtream iſſuing from a ſubterraneous tank, which we ſhould ſoon reach. This ſtream ſwells after heavy rains, and carrying along with it conſiderable quantities of ſand, often renders the cave inacceſſible during its overflow.

Our

Our guide, ſtill advancing and accompanying his obſervations with expreſſive geſtures, entertained us with an account of the rapidity of the current, the height of the water, its quality, and the noiſe which it made; when a ſmall lake, with a ſkiff floating upon it, interrupted our progreſs. This lake, which is not much more than three feet deep, is wholly incloſed in the ſolid rock, and ſtretches under a very low vault of which we could not ſee the farther end. Here it was neceſſary to ſtop.

We ſtood for ſome time on the brink, and the light of our diſmal torches, which emitted a black ſmoke, reflecting our pale images from the bottom of the lake, we almoſt conceived that we ſaw a troop of ſhades ſtarting from an abyſs to preſent themſelves before us. The illuſion was extremely ſtriking.

This piece of water was about forty-eight feet broad; J. Hall gave it the name of the firſt water. He informed us, that we muſt croſs it one by one in the ſmall ſkiff, ſtretching ourſelves at full length, as we had to paſs under the vault which was very low and narrow; he aſſured us, however,

ever, that the paſſage was not attended with the leaſt danger.

Count Andreani embarking firſt, ſtretched himſelf flat in the bottom of the little veſſel which was furniſhed with ſome ſtraw. The guide then entered the lake and bending his head almoſt to the ſurface of the water, puſhed forward the skiff with one hand, while he carried his torch in the other.

Five minutes were ſufficient to croſs over, and to return for another paſſenger. My turn having arrived, I lay flat on my back like the others; but in attempting to move as I paſſed through this low and narrow tunnel in order to examine the ſtone of which it is compoſed, my hat ſtruck againſt the roof, and was thrown into the water. I was ſafely landed on the inner bank, where we ſilently waited the arrival of ſome new companions.

It is impoſſible for the adventurer, however cheerful his temper may be, not to trace in this ſcene a repreſentation of the paſſage of the dead in the fatal bark of Charon. The whole retinue being now landed, Hall, after firſt drying himſelf a little and warming his inſide with a bumper of rum, which he drank to the health of his followers, called our attention

tention to the ſpacious extent of the place which we had now entered. We found ourſelves in a cavern a hundred and twenty feet high, two hundred and twenty feet long, and two hundred and ten broad. It excites real aſtoniſhment to diſcover ſuch extenſive natural excavations in the centre of the hardeſt rock, and one is loſt in conjecturing what has become of the materials which muſt have formerly occupied thoſe vaſt vacuities.

In a paſſage at the inner extremity of this vaſt cavern, we again met with water, which our guide called the ſecond water. But we eaſily paſſed over on a platform running along the ſide of this ſmall pond, which is only thirty feet in length.

On iſſuing from this paſſage we again found ourſelves in a vaſt cavern. At the entrance projects a pile of rocks, from the ſummit of which the water trickles ſlowly and depoſits a calcareous ſediment. This projection has been transformed by the imagination into a houſe, though it has not the ſmalleſt reſemblance to one, and as the water inceſſantly drops from it, the genius of rain is ſuppoſed to have made it his habitation. It is accordingly

ingly diſtinguiſhed by the name of Roger Rain's houſe.

A little beyond this we came to the grand cavern which bears the name of the *Chancel*. The vaults here are very lofty; and in their ſides are different cavities reſembling gothic portals and windows. Large ſtalactites deſcend from the roof upon the prominent parts of the rock, in the manner of drapery or curtains, and produce a very ſtriking effect. The pavement alſo is very ſmooth, being formed of ſolid rock, covered over from time to time with ſome ſtalagmites. The whole has the appearance of a gothic church.

As we advanced our conductor made ſigns to us with his hand, and by expreſſive geſtures, to preſerve ſilence, as if he wiſhed to inſpire us with a reſpectful awe; and he particularly deſired each of us, in a very low voice, not to look behind until he ſhould give notice to do ſo. He then aſſembled his company in a group, and placing himſelf at our head with his face towards us, continued to walk backwards, as if teaching us the military exerciſe, ſtill making ſigns and geſtures in order to attract our whole attention, and inceſſantly requeſting us to keep our eyes fixed on himſelf, leſt

leſt any one ſhould be tempted to look behind. Having in this manner reached almoſt the inner extremity of the cavern, he deſired us to halt. We then heard ſweet and harmonious voices which ſeem to burſt from the lofty roof, and involuntarily turning round to ſee whence the angelic ſounds proceeded, we obſerved in a natural niche at the other end, about forty-eight feet from the bottom, five figures dreſſed in white, immoveable as ſtatues, holding a torch in each hand, and ſinging in parts a ſublime and melodious air to ſome verſes from Shakeſpear.

It thus appeared that Mr. Hall was playing off his grand machinery for our entertainment; he was delighted even to exultation with the ſurpriſe which it produced in us. This unexpected ſcene, indeed, made a very lively and agreeable impreſſion on us. It had a melancholy and affecting character, which might be aſcribed leſs perhaps to the air and words than to the profound and remote place where they were ſung, and where we ſeemed to be ſecluded from the reſt of nature. Thoſe of the ancients who ſelected ſimilar places for their initiations, appear to have admirably managed their buſineſs. Their grand myſte-

ries

ries were never celebrated but in ſubterraneous caverns.

The chantreſſes diſappeared as ſoon as they had finiſhed their ſong, and we proceeded in our courſe through a lengthened gallery. We had been liſtening to angels, and we had now to make a ſhort viſit to the infernal regions. Our maſter of ceremonies, J. Hall, introduced us into what is called *the Devil's cellar*. Here we ſaw a great number of names inſcribed on the walls. I know not whether thoſe who wrote them have entered into a compact with the evil ſpirit, and whether out of gratitude he has permitted them to drink all the wine in his vaults; but this much is certain, that the cellar is at preſent very ill provided. However as there is no entering a cellar without taſting with the butler, eſpecially in England, Mr. Hall pulled out his ſmall bottle, ſwallowed a glaſs of rum, and offered each of us a glaſs after him, but we begged to be excuſed.

On leaving this gloomy manſion, which is nothing elſe than a large cavity blackened by the ſmoke of lamps and torches, we ſuddenly came to a heap of quartzoſe ſand. Here it was neceſſary to proceed along a rapid deſcent a hundred and fifty feet long, and ſinking to

the depth of forty feet below the level of the entrance. On one ſide of this ſandy path is a deep channel, hollowed by nature in the ſolid rock, through which a pretty large ſtream, riſing at a diſtance, gently murmurs along, until it loſes itſelf, with loud noiſe, amidſt ſome caverns.

Here J. Hall played off upon us one of the little tricks of his vocation. He told us in an emphatic tone, that this ſubterraneous brook, notwithſtanding the total privation of light, produced fiſh, but of a ſpecies which he called black fiſh. To give us a proof of his aſſertion, he deſcended to the water through a narrow paſſage, and after plunging his hand repeatedly into the ſtream, held up to our view, at a conſiderable diſtance, one of his black fiſhes. He was about to throw it back into the water to prevent the deſtruction of the ſpecies, which he ſaid was already become ſcarce, when, upon approaching to take a nearer view of it, I ſoon found it to be a tadpole which he had carried with him for the purpoſe of deceiving us, and which was already half dead. He was himſelf the firſt to laugh at the cheat, and he candidly confeſſed it, as ſoon as he perceived that it was detected.

Proceeding

Proceeding forward, we ſoon paſſed under *the arcades*, a place ſo denominated becauſe the rock here forms three diſtinct circular arches, very much reſembling thoſe of a bridge.

A little beyond this we heard the noiſe of a diſtant caſcade, and ſaw a pyramidal maſs of ſtalagmite, which is named *the Tower of Lincoln*. Here the cavern was formerly thought to terminate; but, a few years ago, a new gallery was diſcovered, which extends four hundred and ninety-two feet farther. This we traced to its inmoſt extremity, where the little river again appeared to our view, iſſuing from a natural tunnel as perfectly conſtructed as if it had been the work of art, but ſo ſtrait and low, that there was no poſſibility of penetrating into it. At the entrance of this ſort of aqueduct we ſaw ſeveral names engraved in the rock, among which we diſtinguiſhed thoſe of Sir Joſeph Banks and Dr. Solander, and alſo that of Omai, who accompanied them in this ſubterraneous journey.

The entire length of the cavern, from its entrance to the place where theſe inſcriptions are, is at leaſt two thouſand ſeven hundred and forty-two feet.

We performed our viſit, which laſted ſeveral hours, without the ſlighteſt accident, and returned equally ſafe. We made a liberal acknowledgment for the ſervices of our guide, who was much more fatigued than we were, as he was inceſſantly occupied in pointing out and deſcribing the various objects in our courſe. He appeared to be as well ſatisfied with us as we were with his zeal and obliging readineſs to ſerve us; and though he was a little chagrined at the diſcovery of the black fiſh, we took leave of each other very friendly.

FLUOR SPARS.

Fluor ſpar is an important article of production from the lead mines of Caſtleton, in which it is found in greater abundance than any where elſe. The violet is the moſt common kind, and ſerves as the ſalband to the white ſort. Several other kinds are alſo found there; ſuch as fine yellow topaze coloured, violet blue, violet purple, white inclining to roſe colour, water coloured, &c. There are ſome pieces, in which ſeveral of theſe colours are united and produce a very agreeable effect.

Fluor

Fluor ſpar would be the moſt beautiful of all ſubſtances, if it were only a little harder. This ſtone not only forms a conſiderable object of traffic in its rough ſtate, between Caſtleton and Derby, Winſter, Matlock, Buxton, and other parts in the vicinity, but is alſo worked on the ſpot into vaſes and other articles of ornament, which are ſent to Birmingham, where they are mounted with gilded copper or any other metal.

The largeſt pieces of fluor ſpar do not much exceed a foot in thickneſs, and are very rarely found of that bulk.

LEAD MINES.

The lead mines of Caſtleton are not very rich, and not more than ſixty perſons are employed in them; the principal productions of theſe mines being the different kinds of fluor ſpar above mentioned.

Several mines have been opened in the very ſteep calcareous mountain of *Mann-Zor*.

Oden mine is at a very little diſtance from the town, and preſents a very extraordinary mineralogical phenomenon, conſiſting of a

glittering galena, which is here called *ſtikons-ſides*. It is uſually found in large pieces, forming a double vein. The intermediate ſpace is only a few lines broad, and is filled up with a very white and ponderous gypſeous earth, to which the workmen give the name of *keble* or *caulk*.

To break away large pieces of this glittering galena, they make uſe of a ſharp iron wedge, which they drive with a hammer into the thin bed of keble that ſeparates the two veins.

On performing this operation the miners retire with great haſte to a diſtance; and a few minutes after the veins break aſunder, with a terrible noiſe and a general concuſſion, which muſt overturn all the props of the roof, if they had not carefully provided againſt ſuch accidents by ſtrengthening the principal beams with walls formed of the rubbiſh, and leaving no vacant ſpace. The miners aſſert that a hollow noiſe precedes the exploſion, and marks the moment when they muſt conſult their own ſafety by a ſpeedy retreat.

This terrible phenomenon takes place alſo in the mine of *Lady Waſh* near the village of *Pyam*, in the ſame diſtrict of Derbyſhire.

Mr.

Mr. Whitehurſt has given a very correct deſcription of all the circumſtances connected with this phenomenon. Mr. Ferber, who has likewiſe mentioned it, ſays, that no reaſon could be aſſigned to him for this extraordinary effect; but that he conceives it to ariſe from an effort of the air, which is ſtrongly compreſſed, eſpecially in the narroweſt parts of the vein, to procure itſelf a paſſage.

But to be capable of deciding upon a matter of ſo much difficulty, it would be neceſſary to obſerve with attention all the circumſtances that precede and accompany the exploſion, to know whether there be any inflammation or ſmell. It would be proper alſo to analyze with the minuteſt exactitude the ſubſtance of the gangue, and the keble, which is not yet ſufficiently known.

The theory of gas might tend to throw great light upon this phenomenon. It is known that the phoſphoric acid is ſometimes found in union with lead. The effects of inflammable gas intermixed with phoſphorus are likewiſe well known, and that it kindles with ſuch rapidity by the mere contact of atmoſpheric air, as to produce the moſt violent exploſions. This branch of ſcience, indeed, is now ſuffi-

ciently advanced to enable an intelligent observer, who ſhould have an opportunity of tracing all the circumſtances upon the ſpot, to give a ſatisfactory explanation of this aſtoniſhing phenomenon.

TOAD-STONE CONTAINING LEAD ORE.

Mr. Whitehurſt and Mr. Ferber affirm, that in all the mines which have been yet opened, the vein of ore is found excluſively in the lime-ſtone, and diſappears ſo completely on reaching the bed of toad-ſtone, that not the ſmalleſt veſtige of it is diſcoverable in the latter; but that on piercing through the toad-ſtone, however thick, the vein as certainly makes its re-appearance, and this fact they affirm holds good through every ſeries of ſtrata to any depth. This diſpoſition, however aſtoniſhing, is in general true, and thence Mr. Whitehurſt conceived the opinion that the toad-ſtone which thus ſeparates the calcareous ſtrata and interrupts the courſe of the ore muſt be the reſult of different currents of lava. My thoughts upon this ſubject have been already explained, but if there ſhould ſtill remain any doubt that the toad-ſtone is not a product of volcanic

fire,

ſire, the fact which I am now going to ſtate will be ſufficient to remove them.

Doctor Pearſon having ſpoken to me at Caſtleton of a miner who ſold ſelect ſpecimens for the cabinet, we went to pay him a viſit. I purchaſed from him a collection of the moſt intereſting minerals of Derbyſhire, and ſome fine ſpecimens of fluor ſpar, the cryſtals of which were in the moſt perfect preſervation.

In the courſe of converſation with him, I aſked whether it was true, that no vein of ore was ever found in the toad-ſtone? he replied, that ſuch had uniformly been the fact hitherto, and though long employed in the mining buſineſs, he had never heard that the ſlighteſt trace of lead had been diſcovered in that ſtone; but that he had juſt learned to his coſt that the rule was not without exception, if not in reſpect to the toad-ſtone, at leaſt as to the cat-dirt or channel.

On requeſting a further explanation, he told me, that he had been ruined by working on his own account, a vein, which at firſt had the moſt promiſing appearance, but which, after opening a deep gallery, at a great expence, was loſt in a bed of channel, where, how-

however, it was again recovered, but in too poor a ſtate to indemnify him.

As the mine was but a little way off, he offered to ſhew it to us, eſpecially when he perceived that I doubted his account. Providing himſelf therefore with ſome mining implements, he deſired us to follow him, and we willingly complied.

We directed our ſteps about a mile to the eaſt of Caſtleton, along the ſteep ſide of the mountain which fronts it, and upon a narrow road about 200 feet above the ſubjacent plain. The mountain is calcareous, and in ſome parts exhibits traces of ſtrata; but its general diſpoſition preſents a uniform and continuous maſs like moſt calcareous rocks of great elevation. Marine bodies are not very abundant here; I obſerved, however, a few fragments of entrochi and ſome terebratulæ. Several lead mines have been opened in it, and it alſo affords calamine in an ochreous form.

We ſoon reached the entrance of the gallery which penetrates in an horizontal direction, and opens in the ſtratified part of the calcareous rock, in a ſeam of white calcareous ſpar, which preſents a ſmall but very

diſtinct

diſtinct vein of galena intermixed with fluor ſpar.

This indication, which was regarded as very promiſing in a mountain which contained ſeveral other lead mines, determined Elias Pedley and his aſſociates to commence their operation. But ſcarcely had they reached the depth of twelve feet when the lime-ſtone terminated, and they had the misfortune to meet with the channel.

As, till then, there had never been any inſtance of the moſt ſlender veins of metal being found in this unproductive ſtone, they would have immediately diſcontinued their labours, had not the ſame vein of galena, which they traced through the lime-ſtone, continued its courſe in the channel or trapp. This appearance was ſo extraordinary and novel, that ſeduced by it, the miners purſued the ore in the channel to the horizontal depth of ninety feet, in the conſtant hope that the vein, which never exceeded an inch in thickneſs, would ſoon enlarge its dimenſions.

But the farther they proceeded they found the trapp become ſo hard, and it required ſo much labour and expence to cut through it, that Elias Pedley told us, he was on the point

of

of altogether abandoning the work. This bed of trapp was little more than ſeven feet thick, but it is very probable that it extends a great way into the mountain, when it is conſidered that the gallery had been already carried ninety feet in an horizontal line without diſcovering any appearance of alteration.

This bed of channel, or cat-dirt, is really a greeniſh trapp, very hard in the interior of the mine, but upon being taken out of the gallery and expoſed for ſome time to the atmoſphere, it becomes friable, its colour changes, and it paſſes into an earthy ſtate. It is probable that this decompoſition ariſes from ſome inviſible particles of pyrites, which become efflorescent and cauſe the ſubſtance to fall into a detritus.

Here then is a proof that galena has been found in a bed of channel, in which it has been traced in an uninterrupted line of ninety feet, accompanied with a ſmall portion of calcareous and fluor ſpar. This inſtance exhibits a direct and unequivocal exception to the obſervations hitherto made reſpecting the mines of Derbyſhire. The exiſtence of lead ore in the trapp is a certain proof that it is not the product of fire. I know that thoſe mineralogiſts

ralogiſts who are converſant in the ſtudy of lithology, who have examined the trapp upon the ſpot, and are fully acquainted with that ſtone and all its varieties, have no need of this proof. But the fact appeared to be of ſo much importance that I conceived it proper to mention it, to do away every doubt upon the ſubject. This conſideration, therefore, will form my excuſe to thoſe who may be diſpleaſed at the minute and tedious details which I have been obliged to enter into, that I might place the queſtion in the cleareſt poſſible point of view.

CHAP-

CHAPTER XIX.

Derby.—Richard Brown, a Dealer in Curioſities of Natural Hiſtory.—A Manufacture of Vaſes, and other Workmanſhip, in Fluor Spar.

SATISFIED with what we had ſeen at Caſtleton, we left that little town, and returned to Buxton, where I put in order the collection I had made of the moſt remarkable curioſities of Derbyſhire.

All our buſineſs being finiſhed, we waited upon Doctor Pearſon, thanked him for the kind attention he had paid us, and left Buxton next morning for Derby. This journey occupied eight hours, though we had excellent horſes and good poſtillions, but the road was very bad.

Derby is a commercial town. We ſaw a number of manufactories of different kinds; ſeveral porcelain works, and common potteries. We had been informed that a perſon named Richard Brown, who dealt in natural curioſities, reſided here, and that he had in his poſſeſſion not only the fineſt productions of Derbyſhire,

Derbyſhire, but minerals from different parts of England and Scotland: We viſited him. His ſhop was well repleniſhed with vaſes of every form and every ſize, as well as other works in fluor ſpar of different colours, but much better cut and of a finer poliſh than thoſe ſold at Buxton and Caſtleton. I purchaſed a complete collection of his ſpars cut into ſmall ſquare tablets, in ſuch a manner that they might be placed in drawers, which is the beſt method of keeping them for ſtudy, and the moſt convenient arrangement for a cabinet.

We were told that Mr. Brown charged very high for his curioſities, but we found that he ſold even thoſe which were moſt intereſting and of the fineſt workmanſhip at a very reaſonable price. He was far from ſeeking to take advantage of us becauſe we were foreigners; on the contrary, he was moderate in his demands, and treated us with the greateſt civility. When he ſaw that I was fond of lithology, and that I named ſome ſtones with reſpect to the nature of which he was doubtful, he teſtified much happineſs at ſeeing us, and begged that we would ſtop with him and drink to the friends of the ſcience of

nature.

nature. He inſtantly ordered glaſſes and ſeveral kinds of wine to be brought; but as we had juſt been drinking after dinner, we declined this invitation, of the kindneſs of which however we were very ſenſible, for Mr. Brown preſſed us with the greateſt cordiality.

While we were diſputing this point of politeneſs, a dog, which I had purchaſed in the highlands of Scotland, ſuddenly left me in the ſtreet: he differed from the common ſhepherd dog. The Scottiſh dog has more ingenuity and manages a flock of ſheep better than the ordinary kind. It is alſo excellent for keeping off the fox. I tried, but in vain, to recover this animal: my dog was loſt or rather ſtolen.

Next day we went to ſee another vender of articles of natural hiſtory, who was himſelf a worker in fluor ſpar and marble. He reſided at one of the extremities of the town, by the ſide of a ſmall river, which flowed at a ſhort diſtance from his houſe.

He was a very intelligent young man. I never any other where ſaw vaſes of ſuch perfect forms, ſuch exquiſite lightneſs, and ſuch fine materials; but his prices were higher and his manners leſs accommodating than thoſe

thoſe of Mr. Brown; wiſhing, however, to take ſomething from him, I purchaſed a vaſe which charmed me by the beauty of the colours of the ſpar, its elegant form, and the delicate finiſh of the workmanſhip. This dealer had alſo ſome of the minerals of Derbyſhire for ſale, but in his collection of them I found nothing intereſting.

CHAPTER XX.

Departure from Derby.—Arrival at Birmingham.—Its numerous Manufactures.—Doctor Withering.—Benjamin Watt.—Doctor Prieſtly—His Houſe, Library, and his chemical Elaboratory.

WE left Derby at noon, but as the roads were all very bad in this quarter of the country, we had ſome difficulty in arriving on the ſame day at Birmingham. At nine in the evening we entered an inn in this town, after having croſſed ſome black arrid heaths, and paſſed through a ſavage and dreary region.

We had letters of recommendation to Doctor Withering, the tranſlator of the Sciagraphia of Bergman, and a lover of botanical and chemical ſtudies: We waited on him next day. He inhabits a fine houſe, furniſhed with taſte and elegance. We had tea with him in company with ſome amiable and beautiful ladies, and to complete our good fortune, we were here introduced to Mr. Watt, a man of ſingular merit, one of the moſt ſkilful mechaniſts of England, and who poſſeſſes great

great knowledge in chymiſtry and natural hiſtory.

The extenſive commerce and manufactures of Birmingham render it one of the moſt intereſting towns in England: Here the traveller may have a comprehenſive view of a moſt active and varied induſtry exerciſed in the different arts of utility, of pleaſure, and of luxury.

I know that ſome travellers who have not ſufficiently reflected on the importance and advantage of manufactures in a country, ſuch as England, have diſapproved of extenſive works of the kind eſtabliſhed in this town. I know that even Engliſhmen who have taken but a haſty and inconſiderate view of theſe magnificent eſtabliſhments, have obſerved that it was difficult for the eye to be long pleaſed in the midſt of ſo many frivolous arts, and where the labours of a hundred men are confined to the making of a tobacco box*. But beſides that this ſtatement is exaggerated, theſe travellers have overlooked the vaſt works where ſteam engines are made, theſe aſtoniſhing machines, the perfecting of

* See Gilpin's Picturesque Tour.

which does ſo much honour to the talents and knowledge of Mr. Watt; the manufactories conſtantly employed in making ſheet copper for ſheathing ſhips bottoms; thoſe of plate-tin and plate-iron, which render France tributary to England, and that varied and extenſive hard-ware manufacture which employs to ſo much advantage more than thirty thouſand hands, and compels all Europe, and a part of the new world, to ſupply themſelves with theſe articles here, where every thing is made in greater perfection, with more economy and greater abundance, than in any other country.

I muſt obſerve here, what cannot be repeated too often to Frenchmen, that it is the abundance of coal which gives this advantage, and produces, in the midſt of a barren deſert, a town with forty thouſand inhabitants, who live in plenty, and enjoy all the comforts of civilized life.

The various manufactures in which this uſeful mineral is employed have covered a ſterile and ſombre heath with groves of lillies and roſes, and converted a ſavage wilderneſs into fertile and delicious gardens. The works eſtabliſhed by Meſſrs. Boulton and Watt, in which more than a thouſand hands are em-

ployed,

ployed, have contributed greatly to promote this change.

The population of Birmingham encreaſed ſo much during the American war, that at leaſt three hundred new houſes were, during that period, added annually to the town. At the concluſion of the peace, this increaſe was doubled. The gentleman who made me acquainted with theſe facts, and who poſſeſſed much information, one day ſhewed me a new ſtreet of conſiderable length, in which the conſtruction of the houſes was juſt commenced upon an uniform plan, and the building was carried on with ſo much rapidity that there was little doubt but the whole would be finiſhed in leſs than two months.

I experienced much pleaſure in viſiting Mr. Watt, whoſe extenſive knowledge in chymiſtry and the arts, rendered his converſation very intereſting. His moral qualities, and the engaging manner in which he expreſſed his thoughts, daily encreaſed my reſpect for him. He has a number of fine children, who are all diſtinguiſhed by their information and their talents.

I dined one day with this agreeable family, when Doctor Prieſtly, who is a relation of

Mr. Watt, was preſent; I had the pleaſure of forming an acquaintance with this celebrated man, to whom experimental philoſophy owes ſo many obligations. I afterwards viſited him in company with Mr. Withering. Doctor Prieſtly does not reſide in Birmingham, but at the diſtance of about a mile and a half from the town, in a charming houſe, with a fine meadow on the one ſide, and a delightful garden on the other. There was an air of the moſt perfect neatneſs in every thing connected with this houſe, both without and within it. I know not how to give a better idea of it than by comparing it to thoſe ſnug houſes ſo often to be met with in Holland, particularly on the road from Harlem to Leyden, and from Leyden to the Hague.

Doctor Prieſtly received me with the greateſt kindneſs. He preſented me to his wife and his daughter, who were diſtinguiſhed by vavacity, intelligence, and gentleneſs of manners. The young lady ſpoke to me of one of her brothers, who was then finiſhing his education at Geneva, and to whom ſhe ſeemed very much attached.

The building in which Doctor Prieſtly made his chemical and philoſophical experiments

was

was detached from his houſe to avoid the danger of fire. It conſiſted of ſeveral apartments on a ground floor. Upon entering it we were ſtruck with a ſimple and ingenious apparatus for making experiments on inflammable gas extracted from iron and water reduced to vapour. The tube, which was thick and long, was made of red copper and caſt in one piece to avoid joinings. The part expoſed to the fire was thicker than the reſt. Into this tube he introduced cuttings or filings of iron, and inſtead of dropping in the water, he preferred making it enter in vapour. The furnace deſtined for this operation was ſupplied with coak made of coal, which is the beſt of all combuſtibles for the intenſity and equality of its heat.

By theſe means he obtained a conſiderable quantity of inflammable gas of great lightneſs and without any ſmell. He obſerved to me, that by increaſing the apparatus and uſing iron or copper tubes of a larger calibre, aeroſtatic balloons might be filled with far leſs trouble and expence than by vitriolic acid. Doctor Prieſtly allowed me to take a drawing of this new apparatus for the purpoſe of communi-

cating it to the French chymiſts who are engaged in the ſame purſuit.

The compoſition which Doctor Prieſtly uſed to prevent the gas from eſcaping, either in this or other experiments, appeared to me ſo excellent that I begged of him to tell me how he made it. He informed me, that after a multitude of trials, he had found nothing anſwer the purpoſe ſo well as the paſte of almonds, ſuch as it is when the oil is extracted. This moiſtened with a little water, in which glue had been diſſolved, made an excellent lute. He obſerved, however, that the glue might be diſpenſed with.

Doctor Prieſtly did not regard the experiments made relative to the decompoſition of water as ſatisfactory. He could not admit the fact to be demonſtrated ſo long as the gas was only obtained through the medium of iron, a metal which is itſelf ſuſceptible of inflammability; but he waited with impatience for the reſult of the experiments of the French chymiſts, particularly theſe of Lavoiſier, who had invented, and cauſed to be conſtructed, an extenſive apparatus for the ſame object.

"The decompoſition of water," ſaid this indefatigable philoſopher, addreſſing himſelf

to

to me, " is of ſo much importance in natural " philoſophy, and would occupy ſo diſtin- " guiſhed a place among the phenomena of " the univerſe, that far from admitting the " fact upon ſlight evidence, and as it were " from enthuſiaſm, it were rather to be wiſh- " ed that all objections that may be made, and " which will ſtill long continue to be made " againſt this theory, were completely refuted: " In the conflict of opinions, truth may at " laſt be obtained. But I have ſtill ſo many " doubts upon this ſubject, and I have ſo many " experiments to make, both *pro* and *con*, " that I can as yet regard the queſtion as " only ſtarted *."

Doctor Prieſtly has embelliſhed his ſolitude with a philoſophical cabinet, which contains all the inſtruments neceſſary for his experiments, and a library rendered valuable by a choice of excellent works. The learned

* Mr. Benjamin Watt, who has publiſhed ſome excellent papers upon the theory of fire, was of the ſame opinion with Dr. Prieſtly. " The theory of the decom- " poſition of water is ſeducing," ſaid he to me, " as it " would be convenient for explaining the different pheno- " mena of nature; but the more I reflect on this delicate " ſubject, and upon all that has hitherto been done and " written relative to it, the more I find it involved in diffi- " culties."

poſſeſſor

poſſeſſor employs himſelf in a variety of ſtudies: Hiſtory, moral philoſophy, and religion, have all in their turn engaged his pen. An active, intelligent mind, and a natural avidity for knowledge, gave him a paſſion for experimental philoſophy; but the ſenſibility and gentleneſs of his diſpoſition have ſometimes directed his attention to pious and philanthropic ſtudies, which do honour to the goodneſs of his heart, ſince they always have for their object the happineſs of mankind. Beſides his ſituation as a preacher, renders it often neceſſary for him to ſpeak in public *.

Next day I had the pleaſure of meeting Doctor Prieſtly at Mr. Watt's, where we partook of an agreeable repaſt, in company with ſeveral amiable and intelligent men.

* I ſhall not here detail the perſecution which this worthy man experienced ſince the period in which I ſaw him. His chymical elaboratory, his cabinet of natural philoſophy, his library, his charming houſe, were all deſtroyed by barbarous fanatics. The government has endeavoured to repair this loſs by proportional indemnities, which amounted to fifteen hundred louis. But wiſhing, as a philoſopher, to fly from intrigue and to ſeek repoſe, and deſirous of avoiding ſimilar dangers, he has retired to the United States of America. Let us hope, that in this aſylum, he may proſecute his ſtudies with his uſual zeal, and that he will be able to repair in part the loſs of his valuable manuſcripts.

Mr.

Mr. Watt is a man of great conceptions. Nature has endowed him with a very vigorous mind, and to his other excellent qualities he joins the mildeſt and moſt prepoſſeſſing manners which intereſt even at firſt ſight.

Mr. Watt ſhewed us a corn-mill, which he had conſtructed, and which was ſet in motion by a ſteam engine. The application of this principle to the mechaniſm of a mill is a happy idea, which may be very advantageouſly applied in a country which has few ſtreams, and is rich in coal. This firſt attempt will lead to others, and the principle will ſoon be applied to a number of uſeful purpoſes *.

Mr.

* Since this period ſimilar mills have been ſucceſsfully erected at Nantes, and ſome at Paris, where ſome ſteam engines are uſed for ſtamping coins. Steam engines were firſt eſtabliſhed in France, by the brothers Periers, who joined much activity to a great deal of knowledge: But theſe excellent machines cannot reach the perfection they have obtained in England, until our government ſhall ſeriouſly turn its attention to the opening of coal mines. Thoſe who know the exhauſted ſtate of our foreſts are convinced that the moment will ſoon arrive when we ſhall be obliged to work them from neceſſity. Thoſe who are acquainted with the neglected ſituation of our coal mines, tremble, leſt it ſhould hereafter happen that we ſhall want both wood and coal at the ſame time. There is ſome reaſon for anxiety on this ſubject, when we conſider that at Paris a weigh of bad coal coſts ſix times more than the beſt did ſome years ago. But if the legiſlature were to turn to the

Mr. Watt is ſo familiar with great inventions, poſſeſs ſo much knowledge in the higher branches of mechanics, and has brought the means of execution to ſo much perfection, that he may juſtly be ranked among the men who have chiefly contributed to create the preſent high proſperity of the uſeful arts and commerce in England. He is a native of Scotland: A country which has long been accuſtomed to ſupply England with men who honour it the moſt in every ſcience and profeſſion.

We paſſed ſeveral days at Birmingham, where we may be ſaid to have reſided in the midſt of the arts and induſtry. The ſociety of enlightened men and amiable women added new charms to our ſituation. Our minds were informed and delighted; our heads were filled with facts, and our hearts with gratitude. Such were the pleaſures we experienced in this town. We left it with regret.

the conſideration of this ſubject, as well as that of canals, with the earneſtneſs they deſerve, it would be found that our reſources of this kind are as inexhauſtible as thoſe of another kind, which we have already exhibited to the aſtoniſhment of all Europe.

CHAP-

CHAPTER XXI.

Departure from Birmingham.—Coventry.—Warwick.—Oxford.—Saint Albans.—Barnet.—London.—Return to France.

As we were preparing to leave Birmingham, Mr. Watt requeſted to know whether we could take under our care one of his ſons, who was to go to Paris, and thence to Geneva. We anſwered, that it gave us a great deal of pleaſure to be able to afford him a ſeat in our carriage, in which there was ſufficient room for his accommodation, and that we ſhould pay every poſſible attention to his ſon, who was a very engaging young man. Count Andreani and myſelf were extremely pleaſed to have an opportunity of juſtifying the confidence which Mr. Watt repoſed in us, and of proving to him how happy we were to be able to give him that ſmall mark of eſteem and attachment.

On leaving Birmingham we were delighted to ſee the country on every ſide ſtudded with gentlemens ſeats poſſeſſing a ſimple but elegant

gant appearance, which was greatly heightened by the effect of the roſy colour of the bricks upon the white ground of the ſtone work. Every thing here was ſo much more ſtriking, as theſe elegant habitations were almoſt new. But ſcarcely had we loſt ſight of them, and paſſed through ſome words, when we entered upon an extenſive tract of wild and barren heaths.

Between Birmingham and Coventry we had a view of an ancient manſion belonging to Lord Aylesford. It is not very agreeably ſituated, but it was eaſy to ſee that the proprietor had employed the aſſiſtance of taſte and art in embelliſhing it.

Coventry is a pretty neat little town. The ſpire of the church is ſeen a great way off. The ſoil here conſiſts of broken flints intermixed with reddiſh earth.

From Coventry to Warwick we paſſed over a flat country, in ſome places woody, and in others naked, and with a ſoil like the preceding.

We ſtopped at Warwick in order to viſit the church, which is a very fine ſtructure in the gothic ſtile. The chapel where the chiefs of the houſe of Warwick have been interred,

and

and where is ſeen the tomb of the earl of Leiceſter, is charged with ſculptures and gothic ornaments of the moſt finiſhed neatneſs. Having viſited the other curious monuments of the place, which are deſcribed at length in ſeveral productions, we proceeded on our way to Stratford, celebrated as the birth-place of the immortal Shakeſpeare. We croſſed the river Avon by a bridge of fourteen arches, erected at the expence of one Hugh Clifton, who was a mayor of London, and a native of this town.

We next reached Oxford, where we viſited the moſt remarkable monuments of ſcience and art. But all theſe are already ſo generally known, that it would be ſuperfluous to deſcribe them. I ſhould have been happy to have met here with Mr. Thompſon, a very excellent naturaliſt, with whom I had formed an acquaintance at London, whence he had gone to ſettle at Oxford. But he was unfortunately abſent from home. It would have been not only very agreeable, but alſo very uſeful to us to have ſeen him, as he could have introduced us to the learned men of the place, to whom, from a reliance upon his preſence, we had not provided ourſelves with any recommendation.

From

From Oxford we proceeded to London through Saint Albans and Barnet.

Our ſtay at London was not long. Having taken leave of our learned friends, who had kindly gratified us with the numerous objects of inſtruction and entertainment, which that city affords, we ſet out for Paris, where we arrived five days after. Count Andreani prepared for his return to Milan, young Watt took the road to Geneva, and I remained at Paris.

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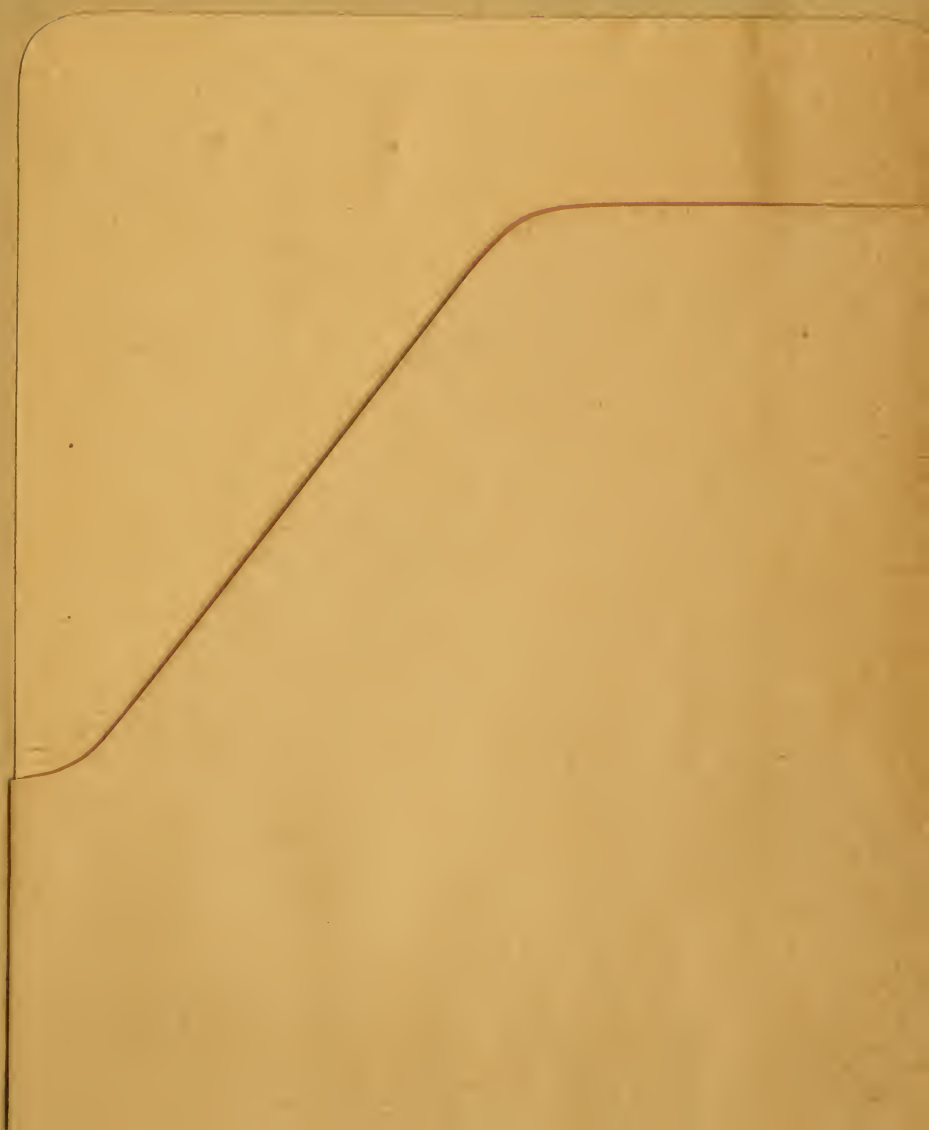
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